

GAME 1187  
FO 647



*Bally*

PINBALL DIVISION

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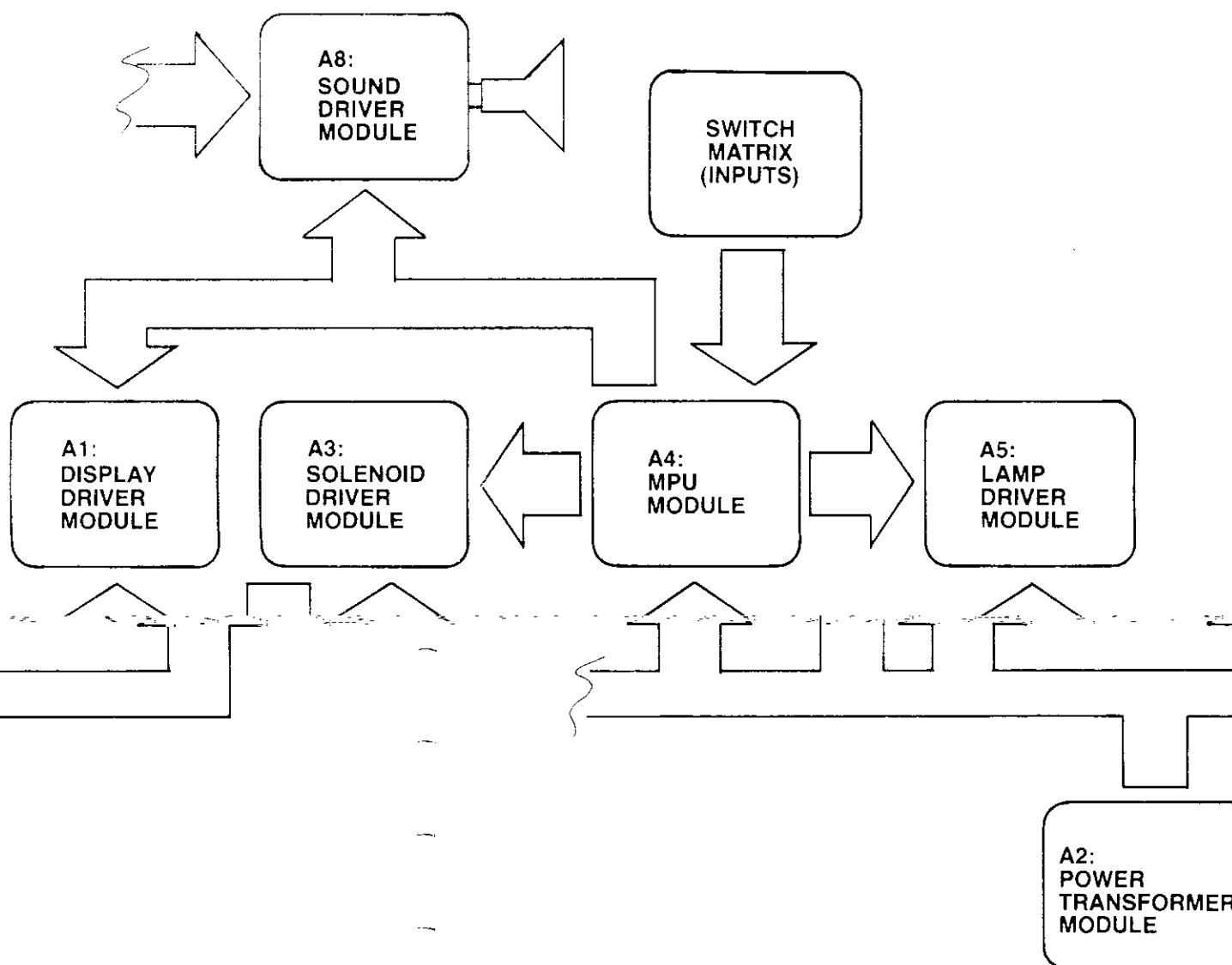
# GAME #1187 ROLLING STONES

## Installation and General Game Operation Instructions

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## BLOCK DIAGRAM—ELECTRONIC PINBALL GAME



## I. INSTALLATION

### Assemble the game as follows:

Bolt legs to cabinet. Bolt back box to cabinet. Use flat washers under bolt heads. Gently feed cable connectors and ground braid through cable port in back box. Screw ground braid to braid in back box. Carefully and fully insert connectors on printed circuit assemblies.

On all games there are certain items that should be checked after shipment. These are visual inspections which may avoid time consuming service work later. Minor troubles caused by abusive handling in shipment are unavoidable. Cable connectors may be loosened, switches (especially tilt switches) may go out of adjustment. Plumb bob tilt switch should always be adjusted after game is set on location and leg levelers are adjusted.

Visual inspections before plugging in line cord:

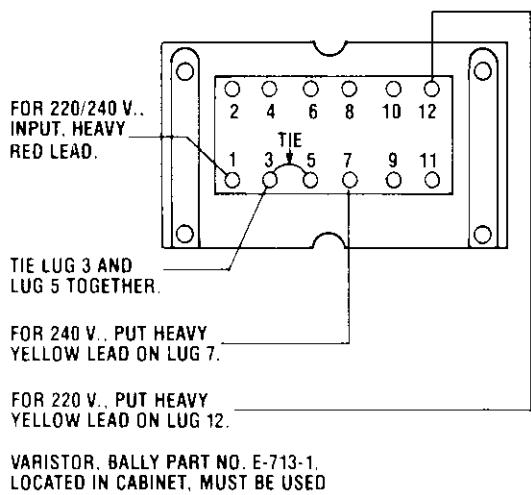
1. Check that all cable connectors are completely seated on printed circuit assemblies.
2. Check that cables are clear of all moving parts.
3. Check for any wires that may have become disconnected.
4. Check switches for loose solder or other foreign material that may have come loose in shipment and could cause shorting of contacts.
5. Check wires on coils for proper soldering. Cold solder connections may not show up in factory inspection, but vibration in shipment may break contact.
6. Check that fuses are firmly seated and making good contact.
7. Check the transformer for any foreign material shorting across wiring lugs.
8. Check wiring of transformer to correspond to location voltage. See figure 1.

Check adjustment of the three (normally open) tilt switches:

1. Panel tilt on bottom of playfield panel.
2. Plumb bob tilt on left side of cabinet near front door.
3. Ball tilt above plumb bob tilt. Insert the smaller ball (15/16" dia.) into the ball tilt assembly, and adjust the bracket so the ball will roll free to contact the switch blade, if front of cabinet is raised.

### TRANSFORMER CONNECTION INSTRUCTIONS

E-122-125 TRANSFORMER WIRING FOR 220/240 V.,  
50/60 CYCLE INPUT.



E-122-125 TRANSFORMER WIRING FOR 115/120 V.,  
50/60 CYCLE INPUT.

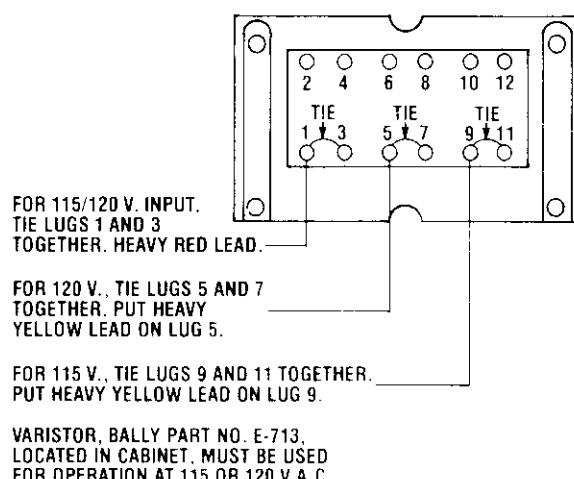


FIGURE I. TRANSFORMER

(PART OF POWER—TRANSFORMER MODULE A2, LOCATED IN BACK BOX).

## II. GENERAL GAME OPERATION

### Place ball into playfield by outhole.

**Coin game.** Coin should be rejected. Plug in line cord. Move power ON-OFF master switch at bottom right front corner of cabinet to 'ON' position. The game will play a power-up tune to announce game-readiness. Drop targets are reset, scores are set to zero, alternating with the 'High Score to Date', and the game is ready for play. Coin game. The game should accept the coin and post credits\* for coins accepted (adjustable). Pressing the credit button on the door will cause the outhole kicker to serve the ball to the shooter alley. The 1st player-up lite is lit. A game-up tune\* is played to announce play-readiness. The bonus score is advanced to 1000 points.

One player is posted each additional time the credit button is pressed (one to four can play). The credits are reduced by one each time the credit button is pressed until the credits are reduced to zero.

Shooting the ball initiates play. Rebound switches score 10 points. Thumper-bumpers, when not lit, score 10 points.

The game awards all points earned by the player. If spinner is turning and scoring when the ball hits a target, the spinner and the target scores are awarded.

When the ball enters the outhole, the bonus score is added to the total score. The player-up and/or ball in play on the back box is advanced one position. The bonus score is advanced to 1000 points. The outhole kicker serves the ball to the shooter alley and play is resumed. This continues until each player has played the allowable number of balls per game (adjustable). At this time the 'Game Over' light is lit. A random Match\* number appears and the 'Match' light is lit. If the number is the same as the last two digits in a player's score, a free game is awarded.

Extra balls won during the course of the game are played immediately after the player's regular ball enters the outhole. The player-up and/or ball in play on the back box are not advanced for extra ball play. Bonus score is added to the player's score and the bonus is set to 1000 points before the game serves the extra ball for play.

Scoring over 1,000,000 gives "High Score to Date" award.

At the end of the game, a 'High Score to Date' is alternately flashed with all 4 player scores. If the 'High Score to Date' is beat, this feature\* awards free games.

Tilting the game results in loss of a ball. The flippers, thumper-bumpers, etc., go 'dead.' Bonus points are not scored. The purpose of the tilt penalty is to discourage the player from jostling the machine in an attempt to prolong play. Game action becomes normal after the ball kicker assembly serves the ball to the shooter alley.

Slamming the machine results in loss of the game. All feature lights go out, the game goes 'dead,' and a time delay occurs. The purpose of the time delay is to discourage unnecessary abuse of the machine. After the delay, the 'Game Over' light lites and the power-up tune is played. The time delay occurs anytime one of the slam switches is made to contact. There is one factory installed slam switch on the front door. (Any number of slam switches could be installed by the operator, to meet his individual requirement.) The switch should be adjusted to have approximately 1/16" gap between the contacts. The weighted blade should be adjusted to attain the desired sensitivity. Decreasing the gap between contacts will make the switch more sensitive. Opening the gap will reduce sensitivity.

\*Some tunes and features can be disabled by operator if so desired. See Back Box Adjustments

### III. BOOKKEEPING FUNCTIONS

The game is designed to help the operator certain perform accounting functions. The game can display the number of total plays and replays (free games). It can display the number of coins dropped down each coin chute. The bookkeeping functions are displayed on all player score displays simultaneously. An identification number, 05 to 14, appears on the Match/Ball in Play window as follows:

- 05— 00 to— 40— Current Credits
- \*06—10000 to—99999=Total Plays (Payed & Free Games)
- \*07—10000 to—99999=Total Replays (Free Games)
- 08— 00 to—99999=Total times 'High Score to Date' is beat
- \*09—10000 to—99999=Coins Dropped thru Coin Chute #1
- \*10—10000 to—99999=Coins Dropped thru Coin Chute #2\*\*
- \*11—10000 to—99999=Coins Dropped thru Coin Chute #3\*\*
- \*12— 00 to—99999=Number of Specials awarded from Panel Specials Only
- \*13— 00 to—99999=Number of minutes of Game Play
- \*14— 00 to—99999=Number of Service Credits

The game displays the first bookkeeping entry if the Self-Test button (See Fig. III) on the inside of the front door is pressed ten times. Alternately push and release the Self-Test button at one second intervals. The number 05 appears in the 'Match/Ball in Play' window. Current credits appear on the player score displays. Each additional press of the button causes the next entry to be displayed.

After the data in each bookkeeping register is recorded, it can be set to zero simply by pressing switch button S33, located on A4, the MPU module in the back box (See Fig. III), or by pressing the Coin Chute #3 switch. Any or all registers can be cleared by alternating between the Self-Test button and the switch button S33 on the MPU module or Coin Chute #3 switch. The operator is given this option as a possible convenience and can elect to use or not use it as his needs direct.

Pressing the button once more with the 14th entry displayed causes the game to play the power-up tune and light the Game Over light.

Service credits are designed to allow the serviceman to test the game under actual play conditions without disturbing the bookkeeping records that reside at identification numbers 06, 07, 09, 10 and 11.

To obtain Service Credits, push and release the Self-Test switch until identification number 05 appears in the 'Match/Ball in Play' window. Hold in the Credit button until the desired number of Service Credits (up to five) appears on the player score displays.

NOTE: If, upon accessing identification number 05, a number of credits greater than five is displayed, pressing the credit button has no effect.

Identification number 14 is reserved as a record of the number of Service Credits used.

\* The 10,000 level is pre-set at the factory; can be set to zero, initially, if desired.

\*\* If Coin Chute is not used in game, number displayed (if other than 00) on Player Score displays has no significance.

## ROLLING STONES

### IV. FEATURE OPERATION & SCORING

#### **A. BONUS SCORE FEATURE**

A bonus score of 1000 to 79,000 may be scored. The game starts with a bonus score of 1000 points. The bonus score advances one step at a time each time the ball hits any one of the #1 to #5 targets or goes thru either of the flipper feeder lanes. The Satisfaction target advances the 3 bonus advances. The bonus score will be advanced between one and five advances when a ball goes into either of the side hoops. The number of advances is determined by its lit value.

20-40-60 bonus

The 20-40-60 bonus is increased in 20,000 point increments.

Completing 1 to 5 the first time lights the 20 thousand light.

Completing 1 to 5 the second time lights the 40 thousand light.

Completing 1 to 5 the third time lights the 60 thousand and the 1-5 special when lit lights.

#### **B. BONUS COLLECT AND BONUS MULTIPLIER:**

When the ball goes into the outhole, the lit bonus score is added to the player's total score. If a bonus multiplier is lit, the bonus score is added to the player's total score by the number of times indicated. Example: If the 5X lite is lit, the bonus score is added five times. A tilt nullifies the bonus score.

#### **THE BONUS MULTIPLIERS ARE LIT AS FOLLOWS:**

Completing R-O-C-K the first time lights 2X

Completing R-O-C-K the second time lights 3X

Completing R-O-C-K the third time lights 5X

#### **C. MEMORY BONUS FEATURES**

The 20-40-60 bonus will remain in memory and be lit with the start of each new ball. The bonus multipliers are also retained in memory from ball to ball.

#### **D. SIDE HOOP FEATURE**

On the left and right sides of the playfield are two hoops. Located in each hoop is a rollover button which scores its lit value. The hoops can be tied together depending on the setting of switch 14.

SW #14

ON: The scoring of the hoops are tied together.

OFF: The hoops score independently of each other.

The 1st hoop scores 2000 + 1 bonus advs

2nd 4000 +

3rd 6000 +

4th 8000 +

5th SPECIAL + LITES OUTLANE SPECIAL

6th 10,000 + 5

#### **E. MEMORY DROP TARGET FEATURE**

In this game the drop target scoring is controlled by an unusual scoring feature knocking down all the drop target scores the lit value at the time the last target is dropped.

#### **F. SATISFACTION TARGET—SAUCER FEATURE**

Knocking down the satisfaction target exposes a saucer which scores the value of the current bonus. The saucer scores the bonus value the 1st time and bonus + extra ball the 2nd time.

This feature is controlled by switches #24 and #32

SW #24 LIB-CON EXTRA BALL SWITCH

ON: If the extra ball light is lit it is held in memory

OFF: No memory

## G. SCORING MINI-POSTS

This game contains two scoring mini-posts they score 50 points each. They are located by the left and the right hoops.

## H. 1-5 FEATURE

This 1 to 5 feature consists of five targets.

Completing 1 to 5 the 1st time lights the 20 thousand bonus light.

Completing 1 to 5 the 2nd time lights the 40 thousand bonus light.

Completing 1 to 5 the 3rd time lights the 60 thousand bonus light.

Completing 1 to 5 the 4th time scores SPECIAL.

This feature is controlled by switch 16

SW #16 LIB-CON 1-5 SWITCH

ON: The numbers which were previously made are in memory

OFF: No memory

## I. R-O-C-K FEATURE

Completing R-O-C-K the 1st time lights 2X

2nd	3X
3rd	5X
4th	SPECIAL

This feature is controlled by switch #8

SW #8 LIB-CON R-O-C-K SWITCH

ON: The letters which were previously made are in memory

OFF: No memory

## J. SPECIAL REPLAY/X-BALL/NOVELTY MODES

Switch #6 and #7 give the operator flexibility to award a replay, extra ball or score (Novelty) when a special is scored (drop target, ROCK, left or right outlane, left or right hoop, 1-5 SPECIAL). The following chart explains the settings.

SWITCH	SW. 6 ON	SW. 6 OFF	SW. 6 ON
Positions	SW. 7 ON	SW. 7 ON	SW. 7 OFF
Rock Special	REPLAY	X-BALL	NOVELTY
Drop Target Special	REPLAY	X-BALL*	50,000
Left or Right Outlane Special	REPLAY	X-BALL*	50,000
Left or Right Hoop Special	REPLAY	X-BALL*	50,000
1-5 Special	REPLAY	X-BALL*	50,000
Saucer X-Ball	X-BALL	X-BALL**	25,000
Scoring Thresholds	REPLAY	X-BALL**	NO AWARD

(\*) 50,000 if Same Player Shoot Again is lit.

(\*\*) 25,000 if Same Player Shoot Again is lit.

## V. GAME ADJUSTMENTS

### A. Playfield Panel Post Adjustments:

Posts that control left and right outlane opening on panel can be moved to make access to outlanes easier or harder for ball to enter. See Figure II.

Easier entry will decrease playing time and scoring (conservative).

Harder entry will increase playing time and scoring (liberal).

### B. Back Box Game Adjustments:

Each game has thirty-two switches located on A4, the MPU module, located in the back box, that allow play to be customized to the location. See Figure III. Credits per coin, maximum credits, credit display, balls per game, match feature, high game feature, special award and melody are selectable by means of the switches. The switches are contained in four-sixteen lead packages numbered S1-8, S9-16, S17-24 and S25-32 for easy identification. The "ON" toggle position is marked on the assembly. **Turn off power before making adjustments.**

#### Credits/Coin Adjustments:

The credits per coin are selectable by means of S17-S20 for coin chute #2. The switch settings and resultant credits/coin are as follows:

S20	S19	S18	S17	Credits/Coin
OFF	OFF	OFF	OFF	Same as Coin Chute #1 Settings
OFF	OFF	OFF	ON	1/1 Coin
OFF	OFF	ON	OFF	2/1 Coin
OFF	OFF	ON	ON	3/1 Coin
OFF	ON	OFF	OFF	4/1 Coin
OFF	ON	OFF	ON	5/1 Coin
OFF	ON	ON	OFF	6/1 Coin
OFF	ON	ON	ON	7/1 Coin
ON	OFF	OFF	OFF	8/1 Coin
ON	OFF	OFF	ON	9/1 Coin
ON	OFF	ON	OFF	10/1 Coin
ON	OFF	ON	ON	11/1 Coin
ON	ON	OFF	OFF	12/1 Coin
ON	ON	OFF	ON	13/1 Coin
ON	ON	ON	OFF	14/1 Coin
ON	ON	ON	ON	15/1 Coin

The credits given per coin are selectable by means of switches 1-5 incl., for coin chute #1 and switches 9-13 incl., for coin chute #3. Thirty-one different credit ratios are available for each coin chute. The switch settings and resultant credits/coin are listed below.

#### CREDITS/COIN ADJUSTMENTS

COIN CHUTE # 1 (HINGE SIDE) OR #3	SWITCHES					CREDITS/COIN
	5 13	4 12	3 11	2 10	1 9	
	OFF	OFF	OFF	OFF	OFF	3 2 COINS**
	OFF	OFF	OFF	OFF	ON	3 2 COINS**
	OFF	OFF	OFF	ON	OFF	1 COIN
	OFF	OFF	OFF	ON	ON	1 2 COINS*
	OFF	OFF	ON	OFF	OFF	2 COIN
	OFF	OFF	ON	OFF	ON	2 2 COINS*
	OFF	OFF	ON	ON	OFF	3 COIN
	OFF	OFF	ON	ON	ON	3 2 COINS*
	OFF	ON	OFF	OFF	OFF	4 COIN
	OFF	ON	OFF	OFF	ON	4 2 COINS*
	OFF	ON	OFF	ON	OFF	5 COIN
	OFF	ON	OFF	ON	ON	5 2 COINS*
	OFF	ON	ON	OFF	OFF	6 COIN
	OFF	ON	ON	OFF	ON	6 2 COINS*
	OFF	ON	ON	ON	OFF	7 COIN
	OFF	ON	ON	ON	ON	7 2 COINS*
	ON	OFF	OFF	OFF	OFF	8 COIN
	ON	OFF	OFF	OFF	ON	8 2 COINS*
	ON	OFF	OFF	ON	OFF	9 COIN
	ON	OFF	OFF	ON	ON	9 2 COINS*
	ON	OFF	ON	OFF	OFF	10 COIN
	ON	OFF	ON	OFF	ON	10 2 COINS*
	ON	OFF	ON	ON	OFF	11 COIN
	ON	OFF	ON	ON	ON	11 2 COINS*
	ON	ON	OFF	OFF	OFF	12 COIN
	ON	ON	OFF	OFF	ON	12 2 COINS*
	ON	ON	OFF	ON	OFF	13 COIN
	ON	ON	OFF	ON	ON	13 2 COINS*
	ON	ON	ON	OFF	OFF	14 COIN
	ON	ON	ON	OFF	ON	14 2 COINS*
	ON	ON	ON	ON	OFF	15 COIN
	ON	ON	ON	ON	ON	15 2 COINS*

\*No Credits until second coin is dropped

\*\*One Credit for first coin. Two Credits for second coin provided that no scoring occurred between first and second coin drops. If scoring occurred second coin drops zero credit.

**MAXIMUM CREDITS:**

The maximum credits accepted by the machine limits the number of games that can be accumulated by coining, by winning replays or both. The maximum number of credits is selectable by means of switches 25 and 26. Four credit limits are available. Switch settings are listed below.

MAXIMUM CREDITS	SWITCHES	
	26	25
10	OFF	OFF
15	OFF	ON
25	ON	OFF
40	ON	ON

BALLS PER GAME:	# BALLS/GAME	SWITCH 31
	5	ON
	3	OFF

**MATCH FEATURE:**

When the Match Feature is ON, a random number appears in the Match/Ball in Play window and the word MATCH is illuminated. If the number matches the tens digit in a player's score, a free game is awarded. The Match feature creates an incentive to play.

CREDIT DISPLAY:	CREDITS DISPLAYED	MATCH	SWITCH 28
		ON	ON
		OFF	OFF
		YES	ON
		NO	OFF

**HIGH SCORE FEATURE:**

The game is designed to award an Extra Ball or Free Game at each of the three score levels. See Front Door Game Adjustments.

AWARD	SWITCH 7	SWITCH 6
REPLAY	ON	ON
EXTRA BALL	ON	OFF
NO AWARD	OFF	ON

**HIGH SCORE TO DATE OR OVER 1,000,000 SCORE FEATURE:**

The game is designed to award free games as an option if high score to date is beat or player exceeds 1,000,000 points. Each time this happens, the winning score becomes the new high score to beat. This score is displayed on all 4 player score displays at the end of each game as an incentive to play. Recommended setting is underlined.

HIGH SCORE TO DATE FEATURE	SWITCH 22	SWITCH 21
No Award	OFF	OFF
One Credit	OFF	ON
Two Credits	ON	OFF
<u>Three Credits</u>	<u>ON</u>	<u>ON</u>

State and local laws may regulate the use of the above features, and they have been designed to allow for appropriate adjustment in order to conform to such requirements.

## ROLLING STONES

### SOUND OPTION:

The game is designed to make several tones and noises to announce power-up, game-up, etc. The tones are intended to attract attention to the game and increase game usage. The tones are controlled by switch settings as shown.

SW. 29, 30 ON

Playfield switches associated noises with background.

SW. 29 ON, SW. 30 OFF

Playfield switches associated noises without background.

SW. 29, 30 OFF

All scoring will have a chime effect.

SW. 29 OFF, SW. 30 ON

Most all scoring will have a laughing noise effect.

### GAME FEATURE OPTIONS:

#### R-O-C-K Rollover Adjustment:

Liberal	SW. 8 ON	Dropping any rollover lite will not come back on.
Conservative	SW. 8 OFF	Dropping any rollover lite will come back on.

#### Left and Right Rollover Button Lite Adjustment:

Liberal	SW. 14 ON	Hitting any rollover button steps left and right lites.
Conservative	SW. 14 OFF	Hitting left or right button steps lites for that side only.

#### R-O-C-K Blip Sound Adjustment:

SW. 15 ON	Making any rollover steps up the blip sound.
SW. 15 OFF	Blip sound is not on.

#### 1 to 5 Target Lite Adjustment:

Liberal	SW. 16 ON	Dropping any target lite will not come back on.
Conservative	SW. 16 OFF	Dropping any target lite will come back on.

#### Thumper Bumpers 100 or 1000 Score Adjustment:

Liberal	SW. 23 ON	Thumpers score 1000
Conservative	SW. 23 OFF	Thumpers score 100

#### Extra Ball Arrow Lite Adjustment:

Liberal	SW. 24 ON	If not made arrow lite will come back on.
Conservative	SW. 24 OFF	If not made arrow lite will not come back on.

#### Saucer Drop Target Adjustment:

Liberal	SW. 32 ON	Hitting target and going into saucer hole will not reset target.
Conservative	SW. 32 OFF	Hitting target and going into saucer hole will reset target.

## C. FRONT DOOR GAME ADJUSTMENTS

### High Score Feature Adjustments:

The game is designed to award an extra ball (option) or a free game at each of three score levels. The recommended levels are on the score card in the game.

Any level from 10.000 to 990,000 can be set, as desired. It is also possible to reset or turn off (00) any or all of the levels, if desired.

1. Push and release Self-Test button (See Figure III) at one second intervals approximately six times or until identification number 01 appears on the 'Match/Ball in Play' display.
2. The number on the Player Score Displays is the score level.\* It can be increased, if desired, by holding the credit button in. To decrease the score level, hold the credit button in and depress and release the Self-Test button. Release the credit button when the desired number appears. Note that the level changes 10,000 points at a time. If the number '00' is left on the displays, the high score feature is eliminated for that level.
3. Repeat steps 1 and 2 for the second and third score levels. The identification numbers '02' and '03' on the Match/Ball in Play display are for the second and third levels, respectively.

### High Score to Date and 1,000,000 Feature:

The game is designed to award free games when 'High Score to Date' is beat, or if the player exceeds 1,000,000 points.

It is recommended that the level, which will build with play, be periodically reset to the factory recommended level to encourage game play. The adjustment procedure is the same as for the High Score Feature Adjustment, Steps 1 and 2. Continue pushing the Self-Test button until the identification number '04' appears on the 'Match/Ball in Play' display and then do Step 2.

Any level from '00' to 990,000 can be set as described. It is to be noted that '00' does NOT turn off the feature, as it does on High Score feature. The feature is turned off by positioning switches as discussed under 'Back Box Game Adjustments.'

\*Can be quickly set to '00' by pressing S33 on the MPU assembly in the back box or Coin Chute switch #3. (See Figure III).

# #1187 ROLLING STONES

## RUBBER PARTS

A	R-521-4	2½" Dia.	(4)
B	R-521-3	2" Dia.	(1)
C	R-521-7	4" Dia.	(1)
D	R-521	¾" Dia.	(1)
E	R-521-2	1½" Dia.	(2)
F	R-406-3	Flipper	(2)
G	R-243	5/16" Dia.	(10)

## PANEL TOP PARTS

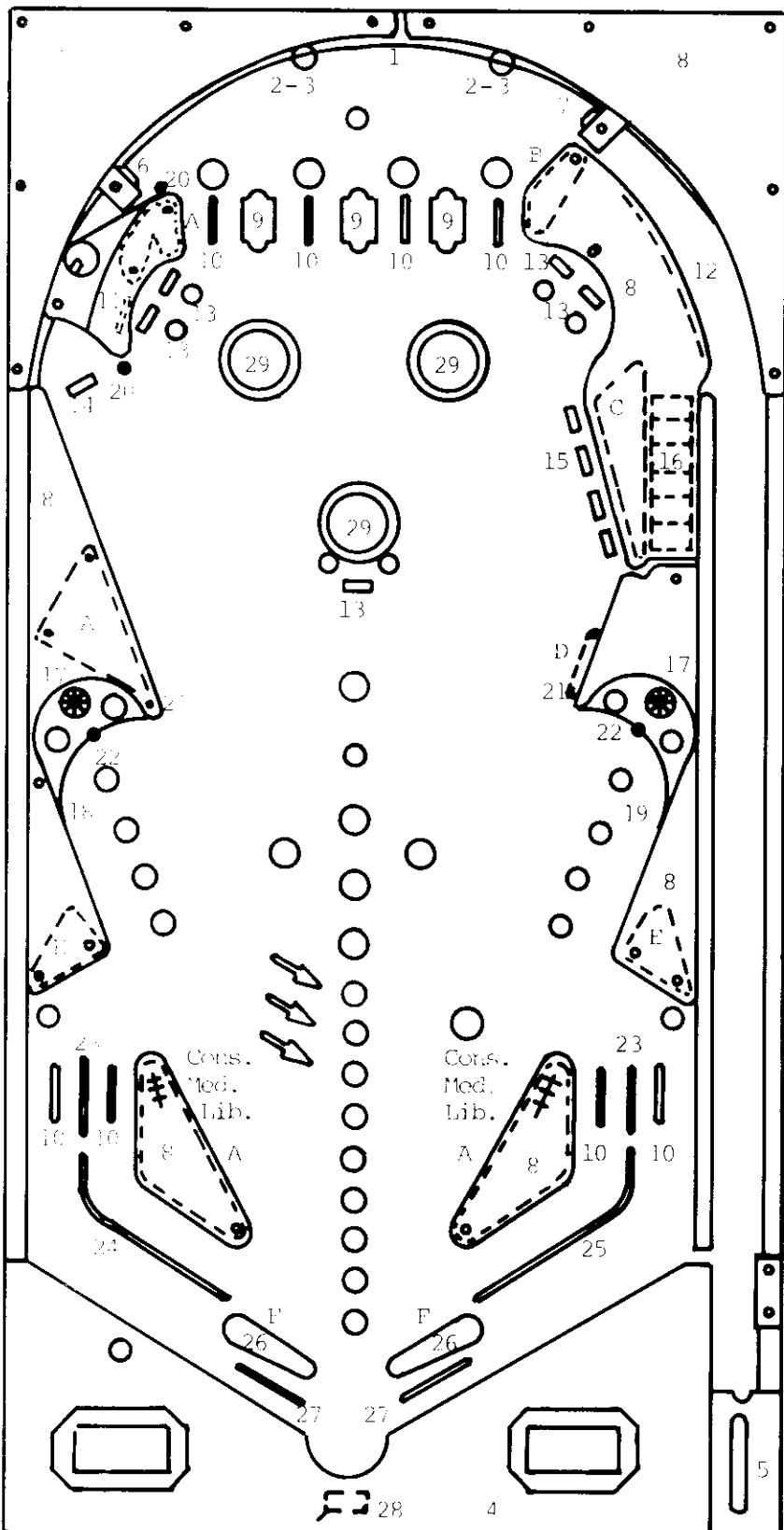
1. Arch Rail	M1774	
2. Rail Post	C-907	(2)
3. Rail Post Cap	C-908	
4. Bottom Arch	P-5871-73	
5. Shooter Gauge	P-6359-39	
6. Ball Gate (L)	A-1475-12	
7. Ball Gate (R)	A-1475-13	
8. Panel Plastics	A-2890-144	
9. Plastic Guide	C-935-1	(3)
10. Rollover Wire Assy.	AS-2806	(8)
11. Ball Guide	M-121-32	
12. Ball Guide	M-121-33	
13. Target Assy. (Red)	ASE-2911-3	(5)
14. Inline Target Assy.	ASE-2993-4	
15. Drop Target Assy.	ASE-3038	
16. Shadow Box	M-1874	
17. Rollover Button	C-900	(2)
18. Ball Guide Assy.	A-3032-43	
19. Ball Guide Assy.	A-3032-42	
20. Minipost & Rubber	ASE-2836-1	(2)
21. Minipost	S-2145-1	(3)
22. Scoring Post Assy.	A-3834	(2)
23. Ball Guide	M-121-93	
24. Ball Guide	M-121-78	
25. Ball Guide	M-121-79	
26. Flipper & Shaft Assy.	ASE-2214-21	(2)
27. Buffer Wire	M-121-53	(2)
28. Outhole Wire Assy.	ASE-2806-21	
29. Thumper Bumper Cap	A-3713-60	(3)

CONS.—Conservative

MED.—Medium

LIB.—Liberal

Indicates Movable Posts  
For Scoring Adjustments.



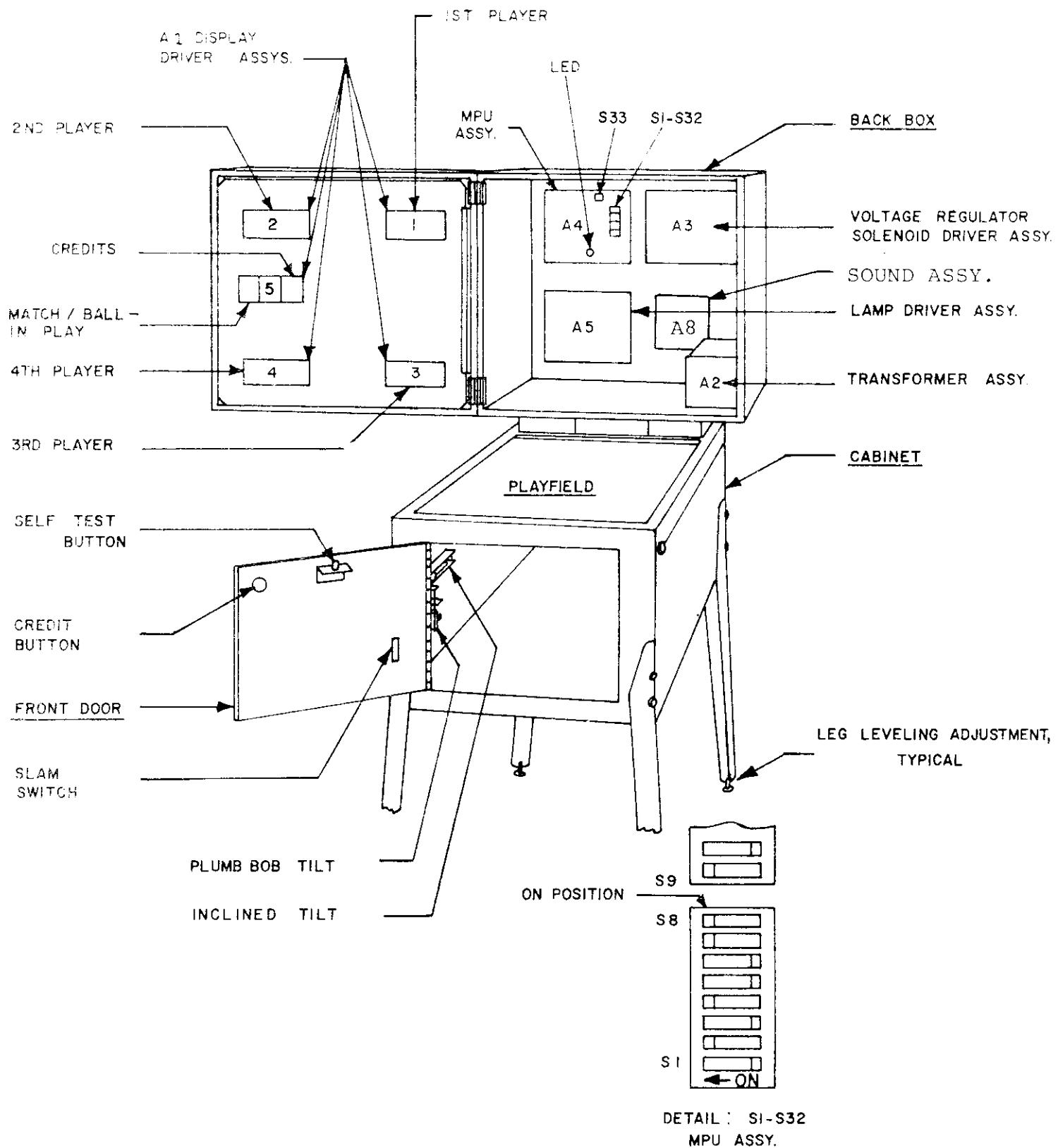


FIGURE III. ELECTRONIC PIN BALL MACHINE

## RECOMMENDED

Instruction, Score Cards and High Score Feature Settings  
to be used on **ROLLING STONES 1187**

3-BALL		5-BALL	
REPLAYS		REPLAYS	
Instruction Card	M-1508-88-E	Instruction Card	M-1508-88-E
Score Card	M-1508-88-B W/O	Score Card	M-1508-88-AW/YY
1 Replay at 260,000		1 Replay at 560,000	
1 Replay at 500,000		1 Replay at 800,000	
EXTRA BALL		EXTRA BALL	
Instruction Card	M-1508-88-F	Instruction Card	M-1508-88-F
Score Card	M-1508-88-MM	Score Card	M-1508-88-SS
1 Extra Ball at 240,000		1 Extra Ball at 420,000	
1 Extra Ball at 480,000		1 Extra Ball at 660,000	
1 Extra Ball at 700,000		1 Extra Ball at 880,000	

## ADDITIONAL CARDS

REPLAYS	EXTRA BALL						
M-1508-H	120,000	360,000	M-1508-MM				
M-1508-I	140,000	380,000	240,000				
M-1508-J	160,000	400,000	270,000				
M-1508-K	180,000	420,000	300,000				
M-1508-L	200,000	440,000	330,000				
M-1508-M	220,000	460,000	360,000				
M-1508-N	240,000	480,000	390,000				
M-1508-O	260,000	500,000	420,000				
M-1508-P	280,000	520,000	Instruction Card, Novelty				
M-1508-Q	300,000	540,000	M-1508-88-G				
M-1508-R	320,000	560,000					
M-1508-S	340,000	580,000					
M-1508-T	360,000	600,000					
M-1508-U	380,000	620,000					
M-1508-V	400,000	640,000					
M-1508-W	420,000	660,000					
M-1508-X	440,000	680,000					
M-1508-Y	460,000	700,000	BLANKS(3)				
M-1508-AA	140,000	430,000	High game to date recommended levels;				
M-1508-BB	160,000	450,000	(reset periodically)				
M-1508-CC	180,000	470,000	3 BALL 580,000				
M-1508-DD	200,000	490,000	5 BALL 880,000				
M-1508-EE	220,000	510,000					
M-1508-FF	240,000	530,000					
M-1508-GG	260,000	550,000					
M-1508-HH	280,000	570,000					
M-1508-II	300,000	590,000					
M-1508-JJ	320,000	610,000					
M-1508-KK	340,000	630,000					
M-1508-LL	360,000	650,000					

## #1187 ROLLING STONES

### RECOMMENDED SETTINGS

#### **SPECIAL: REPLAY**

R-O-C-K ROLLOVER LITE RECALL  
 LEFT & RIGHT ROLLOVER BUTTON LITES  
 R-O-C-K BLIP SOUND  
 1-5 TARGET LITE RECALL  
 THUMPER BUMPERS 100 OR 1000 SCORE  
 EXTRA BALL ARROW LITE RECALL  
 SAUCER DROP TARGET RESET

	<b>3-BALL</b>	<b>5-BALL</b>
SW. 6	ON	ON
SW. 7	ON	ON
SW. 8	ON	OFF
SW. 14	OFF	OFF
SW. 15	ON	ON
SW. 16	ON	ON
SW. 23	ON	OFF
SW. 24	ON	OFF
SW. 32	ON	OFF

The following chart gives recommendations for three typical types of operation.

#### **REPLAY**

Instruction Card  
 Score Card  
 Major Mode  
 Match  
 High Score to Date

#### **3-BALL**

M-1508-88-E  
 M-1508-88-B W/O  
 SW. 6, 7, ON  
 SW. 28 ON  
 SW. 21, 22, ON

#### **5-BALL**

M-1508-88-E  
 M-1508-88-A W/YY  
 SW. 6, 7, ON  
 SW. 28 ON  
 SW. 21, 22, ON

#### **X-BALL**

Instruction Card  
 Score Card  
 Major Mode  
 Match  
 High Score to Date

M-1508-88-F  
 M-1508-88-B w/MM  
 SW. 6 OFF  
 SW. 7 ON  
 SW. 28 OFF  
 SW. 21, 22, OFF

M-1508-88-F  
 M-1508-88-A w/SS  
 SW. 6 OFF  
 SW. 7 ON  
 SW. 28 OFF  
 SW. 21, 22, OFF

#### **NOVELTY**

Instruction Card  
 Major Mode  
 Match  
 High Score to Date

M-1508-88-G  
 SW. 6 ON, 7, OFF  
 SW. 28 OFF  
 SW. 21, 22, OFF

M-1508-88-G  
 SW. 6 ON, 7, OFF  
 SW. 28 OFF  
 SW. 21, 22, OFF

#### **ADDITIONAL CARDS FOR PAGE 11**

#### **REPLAYS**

M-1508-UU	480,000	720,000
M-1508-VV	500,000	740,000
M-1508-WW	520,000	760,000
M-1508-XX	540,000	780,000
M-1508-YY	560,000	800,000
M-1508-ZZ	580,000	820,000
M-1508-AAA	600,000	840,000
M-1508-BBB	620,000	860,000
M-1508-CCC	640,000	880,000
M-1508-DDD	660,000	900,000

M-1508-EEE	380,000	670,000	820,000
M-1508-FFF	400,000	690,000	840,000
M-1508-GGG	420,000	710,000	860,000
M-1508-HHH	440,000	730,000	880,000
M-1508-III	460,000	750,000	900,000
M-1508-JJJ	480,000	770,000	920,000
M-1508-KKK	500,000	790,000	940,000
M-1508-LLL	520,000	810,000	960,000
M-1508-MMM	540,000	830,000	980,000
M-1508-NNN	560,000	850,000	990,000

## VIII. ROUTINE MAINTENANCE ON LOCATION:

Self-Test routines are written into the game design. They are particularly useful for routine maintenance. The tests are described below. The first test is automatic and occurs on power-up. This test causes the MPU module A4 to examine itself for failures. Seven flashes of an LED indicates proper operation. The second series of self-diagnostic tests causes the MPU to 'exercise' each of the other modules in such a way as to make their faults, if any, obvious. See Figure III and Page ii.

It is recommended that these tests be used several times a week to check out the games before play. If faults are discovered, they may be corrected on location if the operator has a stock of replacement modules. See "Trouble Shooting on Location."

### **MPU Module Self-Test:**

At power on, the LED on the MPU module flashes once. (Flicker-Flash). After a pause, it flashes six more times and goes out. A power-up tune is played to announce game readiness. This indicates proper MPU operating condition and successful completion of the power-up test.

### **Game Self-Diagnostic Tests:**

1. Pressing the Self-Test button inside the door initiates the Self-Test routine. See Figures III and IV. All switched lamps flash off and on continuously.
2. Pressing the Self-Test button again causes each digit on each display to cycle from 0 thru 9, and repeat continuously.
3. Pressing the Self-Test button again causes each solenoid to be energized, one at a time, in a continuous sequence. Hold both flipper buttons 'in' during this test. The number appearing on the Player Score displays is the same as the number assigned to the solenoid. The sound of a solenoid pulling-in as a number appears indicates proper operation. The absence of sound is improper. If sound is absent, see Page 17 for help in Solenoid identification.
4. Pressing Self-Test button again causes the sound module to play the "Game Over" tune repeatedly.
5. Pressing the Self-Test button again causes the MPU to search each switch assembly for stuck contacts. If any are found, the number of the first set encountered is flashed on the Player Score displays. The number remains until the fault is cleared. See Page 17 for help in Stuck Switch identification. Other numbers may follow if more stuck contacts are present. If there are no stuck switches, the Match/Ball in Play display flashes '0'.
6. Pressing the Self-Test button 14 more times causes the MPU to step thru the threshold and bookkeeping functions described previously and finally to repeat the power-up test. For more rapid exit to power-up, turn the game off, then on. The game is now ready to play.

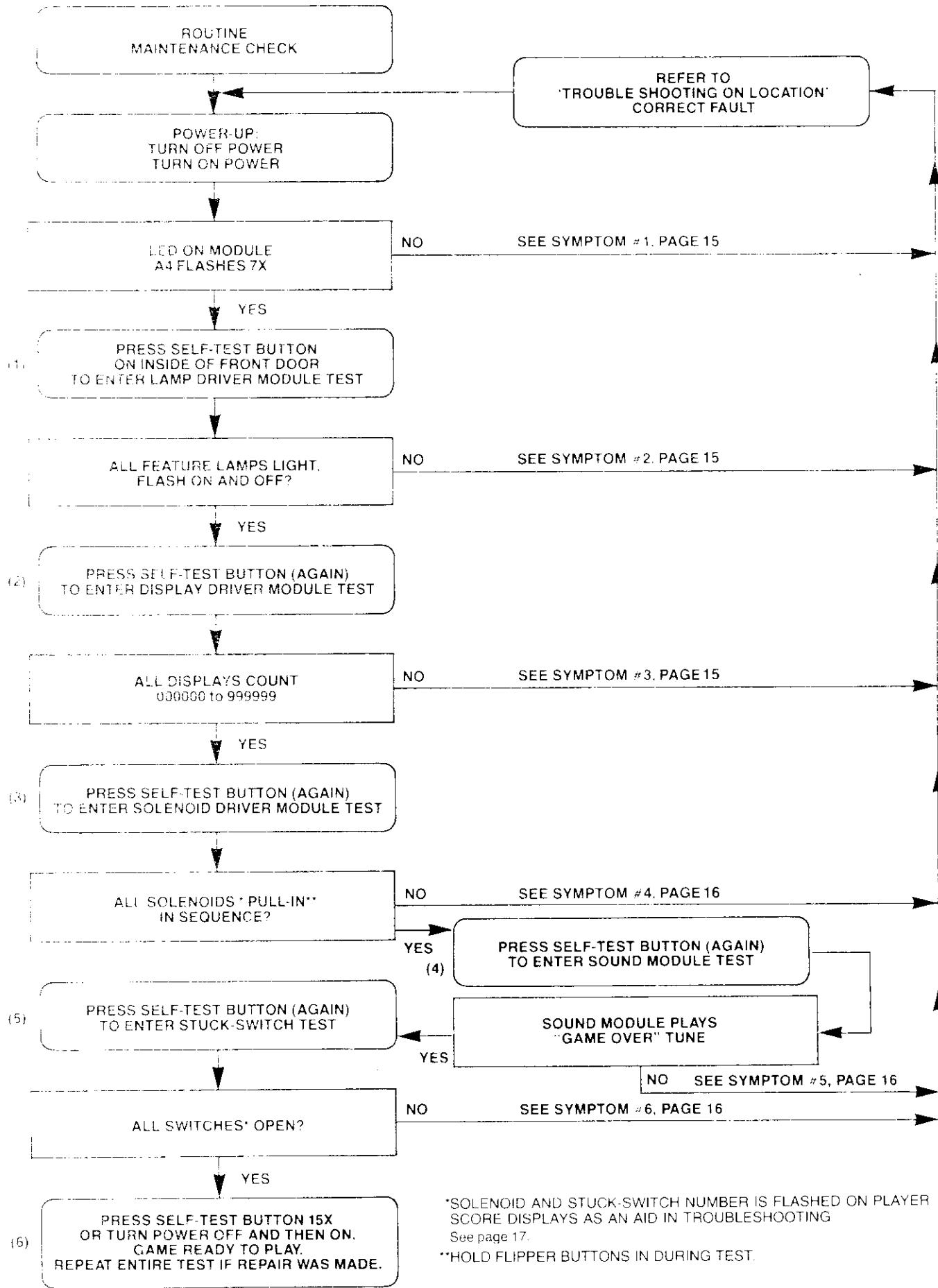
After successful completion of the Self Diagnostic Test procedure, set the game up for play. Exercise each rollover, thumper-bumper, slingshot, etc., by hand until each switch assembly on the playfield has been checked for proper operation. If actuating a switch assembly results in intermittent or no response, clean contacts by gently closing them on a clean business card or piece of paper and wiping until they wipe clean. Regap, if necessary, to 1/16". **Do not burnish or file Gold Plated Switch Contacts.**

## IX. TROUBLESHOOTING ON LOCATION

The game is designed to make troubleshooting easy. Several simple procedures are given herein that cover the greatest percentage of game failures. They are written for an operator on location and require module replacement. (See Figure III!) Symptoms and the action to be taken are given for each type of problem.

If the problem is more complicated and is not solved by following this procedure, more detailed procedures are available from Bally. See the Parts List for ordering information.

FIGURE IV SELF DIAGNOSTIC TEST



**1A) SYMPTOM:** Game does not play power-up tune when power is turned on. General illumination is present.

**ACTION:**

- A)** Turn power OFF. Open back box. Locate light emitting diode (LED) on MPU module A4.
- B)** Turn Power ON. LED must flash 7X to indicate that module A4 is good. Correct flash sequence is flicker/flash-pause-and then six more flashes and LED goes out.
- C.** If LED does not come on, or does not flash, or flashes, but less than 7X, turn off power. Replace MPU module A4.

**CAUTION:** **Replacement MPU Module must have same Part Number or incorrect operation will result! See Parts List for MPU Module Part Number.**

Turn power ON.

**D)** If game is correct, it is now ready for play. If game is not correct, refer to Module Replacement procedure. (See Parts List.)

**2A) SYMPTOM:** Not all feature lamps light during game play.

**ACTION:**

- A)** With power ON, open front door. Press button (Self-Test switch) once. If the game is correct, **all** feature lamps flash ON and OFF.
- B)** Carefully raise playfield or open back box to gain access to lamps.
- C)** Replace bulbs that do not flash.
- D)** If game is correct, it is now ready for play.
- E)** If game is not correct, turn power OFF. Replace Lamp Driver Module A5. Turn power ON and repeat A.
- F)** If game is correct, it is now ready for play.\*
- G)** If game is not correct, turn power OFF. Replace MPU module A4. See CAUTION, 1C. Turn power ON and repeat A.
- H)** If game is correct, it is now ready for play.\* If game is not correct, refer to Module Replacement procedure. (See Parts List.)

**2B) SYMPTOM:** One or some switched lamps always ON.

**ACTION:** Repeat 2AA, AB, AE, and AF and, if necessary AG & AH.

**3A) SYMPTOM:** Display digits improper on **one** or **several**, but less than all Display Driver module(s), A1. Improper: One or several segments always OFF, digits mottled or several segments or digit(s) always ON.

**ACTION:**

- A)** With power ON, open front door. Press button (Self-Test switch) twice. If the game is correct, each digit on each Display Driver Module A1 (5 used/game) displays the count 1-9 and 0 continuously in all 6 digit positions. Note defective Display Driver modules.
- B)** Turn power OFF.

**CAUTION: High Voltage is supplied to the Display Driver Modules, A1, from the Solenoid Driver/Voltage Regulator Module A3. Wait 30 seconds for High Voltage to Bleed Off.**

- C)** Replace Display Driver module(s) A1. Turn power ON. Repeat A.
- D)** If game is correct, it is now ready to play.\* If game is not correct, refer to Module Replacement procedure. (See Parts List.)

**3B) SYMPTOM:** **All** displays improper (all five display Driver modules). Improper: Digit(s) always on or off/segment(s) always on or off, all displays.

**ACTION:**

- A)** Repeat 3AA, and AB.
- B)** Replace MPU module A4. See CAUTION NOTE, 1C. Turn power ON. Repeat A.

C) If game is correct, it is now ready to play.\* If game is not correct, refer to Module Replacement procedure. (See Parts List.)

3C) **SYMPTOM:** One or several displays always off.  
**ACTION:** A) Do 3AA, AB, AC, and AD.  
 B) Repeat 3BB and BC, if necessary.

4A) **SYMPTOM:** Solenoid(s) do(es) not pull-in during course of game.  
**ACTION:** A) With power ON, open front door. Press button (Self-Test switch) three times.  
 B) If game was correct, each solenoid would be energized. A number is flashed on the Player Score displays as each solenoid is pulsed. Note any numbers that do not have the sound of a solenoid associated. See Solenoid Identification Table, Page 17 and Figure V.  
 C) Carefully lift the playfield (or open the back box) to gain access to the solenoid. Turn power OFF. Inspect the solenoid.  
 D) If a lead is broken off, repair. Repeat A & B. If game is correct, it is now ready for play.\* If solenoid wiring was correct, turn power OFF.  
 E) Replace Solenoid Driver/Voltage Regulator module A3. See CAUTION NOTE 3AB.  
 F) Repeat AA & AB. If game is correct, it is now ready to play.\* If game is not correct, turn power OFF.  
 G) Replace Sound Module A8.  
 H) Repeat AA and AB if game is correct. It is now ready to play. If game is not correct, turn power OFF.  
 I) Replace MPU module A4. See CAUTION NOTE, 1C.  
 J) Repeat A & B. If game is correct, it is now ready to play.\* If game is not correct, refer to Module Replacement Procedure. (See Parts List.)

4B) **SYMPTOM:** Solenoid(s) always energized—Note: if impulse solenoids (ball ejects, slingshots, thumper-bumpers, etc.) are energized continuously, they are subject to damage. Limit troubleshooting to one minute with power ON, followed by **five minutes with power OFF**. Repeat as necessary. Replace damaged solenoids.  
**ACTION:** Do 4AA, AB, AE, AF, AG, AH and if necessary, AI and AJ.

5) **SYMPTOM:** No Sound.  
**ACTION:** A) With Power ON, open front door, press Self-Test switch four times.  
 B) Turn volume control clockwise to Max.  
 C) If correct, sound will be heard. If incorrect, try seating speaker lead connector (J2) and input connector (J1).  
 D) If correct, sound will be heard. If incorrect, refer to Module Replacement procedure."

6) **SYMPTOM:** Feature (Drop Targets, etc.) does not score.  
**ACTION:** A) With power ON, open front door. Press button (Self-Test switch) five times.  
 B) If the game is correct, Match/Ball in Play display would flash '0'. If a number appears on the Player Score displays, see Switch Assembly Identification Table, Page 17 and Figure V.  
 C) Carefully lift the playfield. Locate the switch assembly identified from the number. Visually inspect the switch assembly. If the contacts are 'stuck', regap them to 1/16". See section under ADJUSTMENTS. Repeat A & B. If the game is correct, it is now ready to play.\* If game is not correct, turn the power OFF.  
 D) Replace MPU module A4. See CAUTION NOTE 1, C.  
 E) Repeat A & B. If the game is correct, it is now ready to play.\* If the game is not correct, refer to Module Replacement Procedure. (See Parts List.)

7) **SYMPTOM:** Game blows fuse(s) repeatedly.  
**ACTION:** See Module Replacement Procedure. F.O. 560

\*Turn power On-Off switch OFF and then ON.

**GAME #1187 ROLLING STONES (Figure V)**  
**SOLENOID IDENTIFICATION TABLE**

Self Test #	SOLENOID IDENTIFICATION	Self Test #	SOLENOID IDENTIFICATION
01	OUTHOLE KICKER	09	RIGHT DROP TARGET "A" (TOP)
02	KNOCKER	10	RIGHT DROP TARGET "B"
03	LEFT THUMPER BUMPER	11	RIGHT DROP TARGET "C"
04	RIGHT THUMPER BUMPER	12	RIGHT DROP TARGET "D" (BOTTOM)
05	BOTTOM THUMPER BUMPER	13	4 DROP TARGET RESET
06	LEFT SLINGSHOT	14	COIN LOCKOUT DOOR
07	RIGHT SLINGSHOT	15	KI RELAY (FLIPPER ENABLE)
08	SAUCER KICKER	16	SAUCER DROP TARGET

**SWITCH ASSEMBLY SELF-TEST DISPLAY NUMBERS**

Switch Self Test #	DESCRIPTION	Switch Self Test #	DESCRIPTION
01		21	DROP TARGET #4 (BOTTOM)
02		22	DROP TARGET #3
03		23	DROP TARGET #2
04		24	DROP TARGET #1 (TOP)
05		25	
06	CREDIT BUTTON	26	RIGHT SIDE R.O. BUTTON
07	TIILT (3)	27	LEFT SIDE R.O. BUTTON
08	OUTHOLE	28	#5 TARGET
09	COIN III (RIGHT)	29	#4 TARGET
10	COIN I (LEFT)	30	#3 TARGET
11	COIN II (MIDDLE)	31	#2 TARGET
12	#1 TARGET	32	SAUCER
13	SAUCER DROP TARGET	33	50 POINT REBOUND AND SCORING MINI POST (2)
14	RIGHT OUTLANE	34	FLIP/FEED LANE (RT.)
15	LEFT OUTLANE	35	FLIP/FEED LANE (LT.)
16	SLAM (2)	36	RIGHT SLINGSHOT
17	"K" ROLLOVER	37	LEFT SLINGSHOT
18	"C" ROLLOVER	38	BOTTOM THUMPER BUM.
19	"O" ROLLOVER	39	RIGHT THUMPER BUM.
20	"R" ROLLOVER	40	LEFT THUMPER BUM.

**NOTE: SLINGSHOT & THUMPER BUMPER COILS  
WILL BE ENERGIZED WHEN SWITCH IS MADE.**

**#1187 ROLLING STONES**

○ INDICATES SWITCH ASSEMBLY  
IDENTIFICATION NUMBERS.

NOTE: CABINET: 07, 16  
DOOR: 06, 09  
10, 11, 16

□ INDICATES SOLENOID  
IDENTIFICATION NUMBERS.

NOTE: DOOR: 14  
BACKBOX: 15  
CABINET: 02

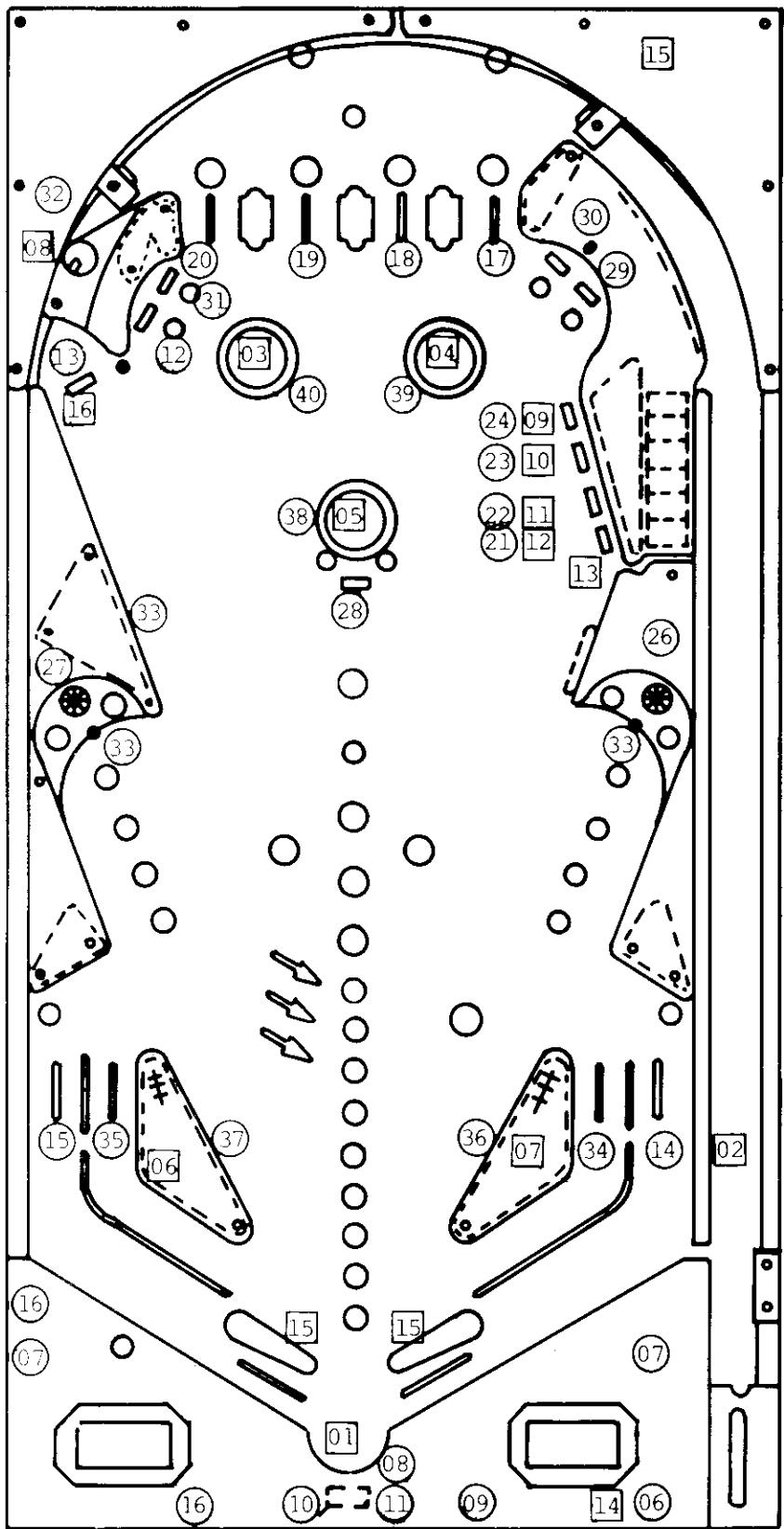


FIGURE V

## ASSEMBLY ADJUSTMENTS:

### GENERAL:

All switch assemblies consist of leaf springs, contacts, separators, plastic tubing and screws to hold them to the mounting surface. Before attempting to adjust a switch assembly, make sure that these screws are tight. If not, tighten screw closest to the contact end of the leaf spring first. This will prevent the assembly from being secured in such a manner that the leaf springs tend to fan out. In general, all leaf springs are adjusted for a 1/16" gap in the open position and .010" overtravel or wipe in the closed position. All contacts should be in good condition. Unless otherwise instructed, they should be dry or non-lubricated. All contacts should be free of dust and dirt. Contacts, with the exception of the flipper button switch assemblies, are plated to resist corrosion. Filing or burnishing breaks the finish and encourages corrosion. Clean by closing the contacts over a clean piece of paper (e.g. a business card) and wiping gently until the contacts are clean. For the flipper button switch assemblies **ONLY**: Tarnish can be removed with a contact file followed by a burnishing tool. Severely pitted contacts must be replaced as an assembly. In general, contacts need be cleaned or replaced and adjusted only when they are found to be a source of game malfunction.

## X. SERVICE PARTS:

A parts catalogue is available upon request. The catalogue is illustrated and lists all replacement parts for each game manufactured by Bally. Requests should be addressed to:

BALLY MANUFACTURING CORPORATION  
2640 WEST BELMONT AVENUE  
CHICAGO, ILLINOIS 60618  
ATTN: PARTS DEPARTMENT

### SERVICE HINTS:

The Bally playfield has an improved tuff-coat finish with excellent wearing properties. Its life expectancy, as well as play appeal, can be extended by periodic cleaning of the playfield.

**DO:** Bally recommends you clean your playfield with Wildcat #125 (Wildcat Chemical Co., 1333 W. Seminary Drive, Ft. Worth, Texas 76115). Wildcat #125 is a combination cleaner and polish. Bally has tried and tested this product and found it to be very effective. If Wildcat #125 is not available, Bally suggests you ask your Distributor to order it. Inspect and hand polish the ball in a clean cloth. A chipped ball must be replaced. It can ruin the finish on the playfield in a short period of time.

**DON'T:** Use water in large quantities, highly caustic cleaners, abrasive cleaners or cleaning pads on the playfield. Do not allow a wax or polish build up. Waxes yellow with age and spoil play appeal.

## XI. PARTS LIST #1187 ROLLING STONES

### MISCELLANEOUS

	PART NUMBER
Transformer (Domestic or Export) .....	E-122-125
Bulbs, #44 .....	E-125-22
Fuse, 1 Amp. 3 AG Slow Blow (Playfield Solenoid Protection) .....	E-133-44

### ASSEMBLY COILS

Coin Lockout .....	FO-36-7000
Flipper (2) .....	AQ-25-500/ 34-4500
Knocker .....	AR-26-1200
Outhole Kicker .....	AN-26-1200
Thumper-Bumper (3) .....	AN-26-1200
Sling-Shot (2) .....	AO-26-1200
4 Drop Target .....	NO-26-1900
Single Drop Target .....	AN-26-1200
Individual Drop Targets (4) .....	CJ-31-2000
Saucer .....	AO-27-1300

### PLAYFIELD PARTS

See Figure II

### MODULES

Lamp Driver A5 .....	AS-2518-23
Display Driver A1 (5 used) .....	AS-2518-21
Solenoid Driver/Voltage Regulator A3 .....	AS-2518-22
MPU A4 .....	AS-2962-16
Transformer & Rectifier A2 .....	AS-2877-1
Rectifier Board (Part of A2) .....	AS-2518-18
Sound .....	AS-3022-5

### REPAIRS PROCEDURES/AIDS

Module & Component Replacement .....	F.O.560-1
AID (Assistance in Diagnostics) .....	KIT #485-1
Kit, used with F.O.560-1 .....	KIT #485-1

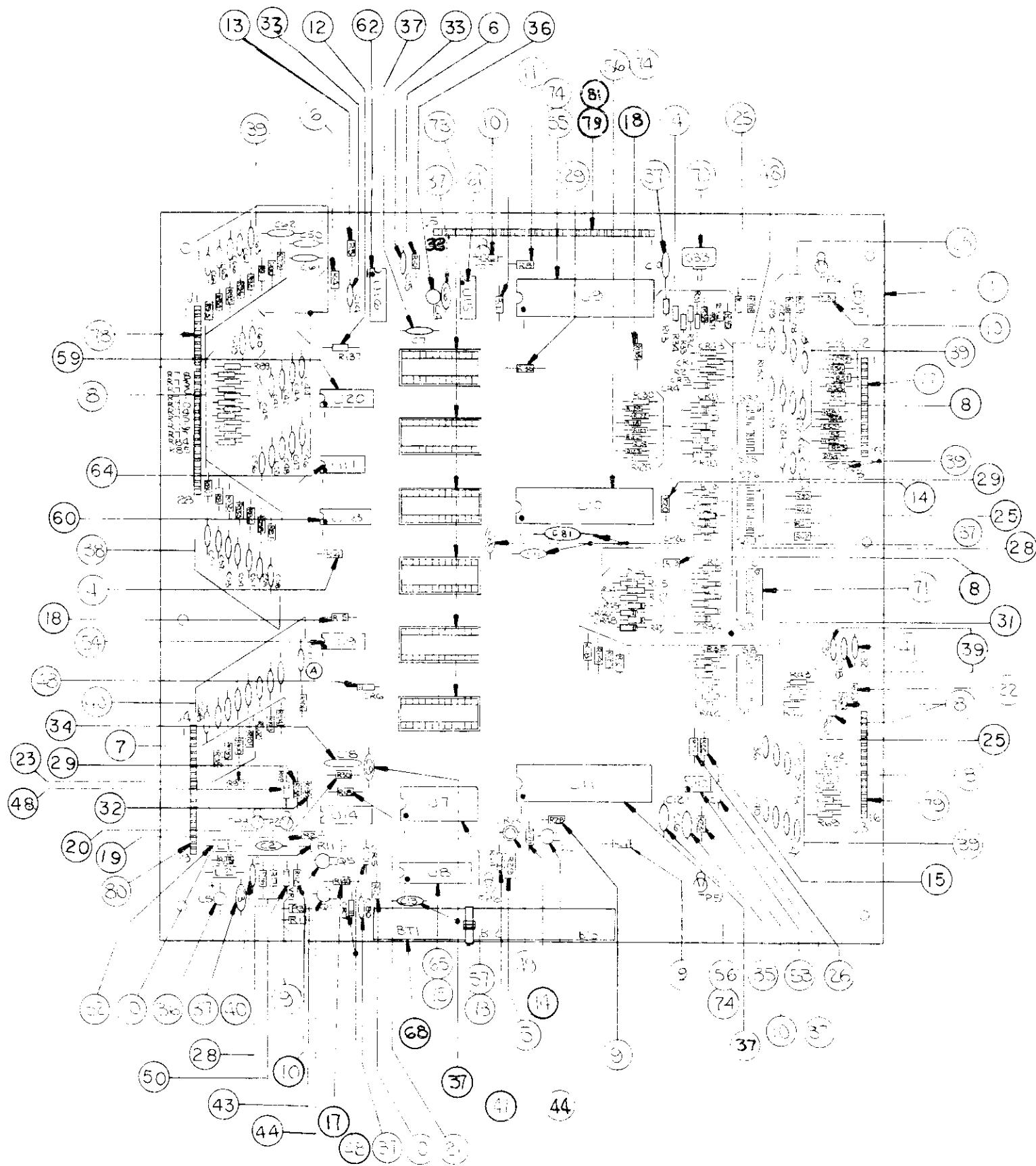
### MODULE COMPONENTS

SEE MODULE PARTS LIST

### MODULE COMPONENT STARTER KITS

(Each Kit contains an assortment of the most needed electronic parts for use in Module repair.)	
Kit #490—For Rectifier Board (Part of A2)	
Kit #503—For MPU Board A4 (Less Memory U1-U6)	
Kit #492—For Solenoid Driver/Voltage Regulator A3	
Kit #493—For Display Driver A1	
Kit #494—For Lamp Driver A5	
Kit #559—For Sound A8	

AS-2518-35 MPU MODULE



## A4: MPU MODULE COMPONENT PARTS LIST

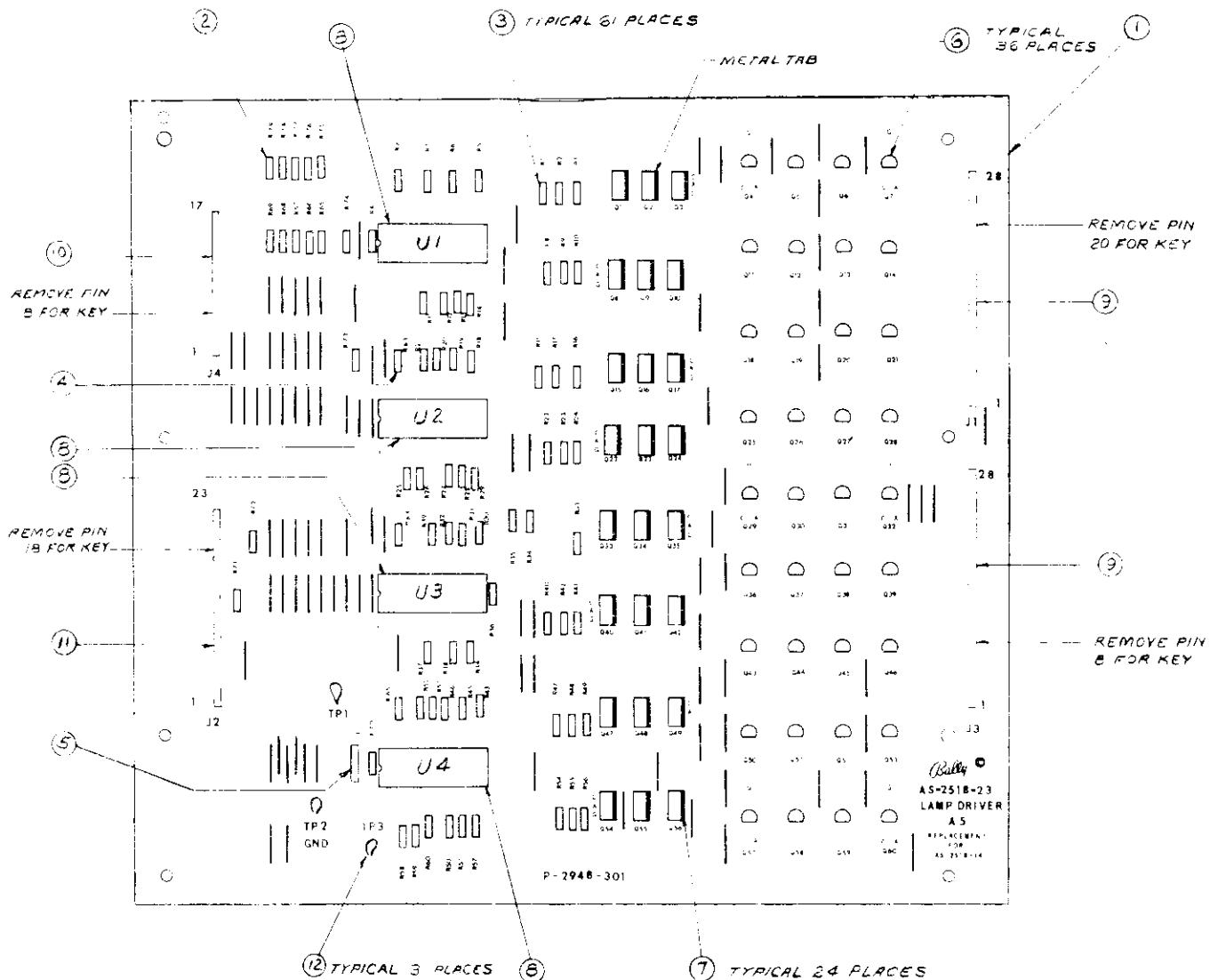
ITEM	REFERENCE DESIGNATION	BALLY PART #	DESCRIPTION
1	A4 (see note 1)	AS-2962-16	MPU Module Complete. Rolling Stones
2	A4 (see note 2)	AS-2518-35	MPU Module less Program Memory, U1-6 incl.
3-32	See Schematic		Resistors, See schematic for value
33	C14, C15	E-00586-0067	Capacitor, 470 PFD, 1kv
34	C18	E-00586-0088	Capacitor, .05 MFD, 16V
35	C16	E-00586-0081	Capacitor, .1 MFD, 100V
36	C4, C5	E-00586-0073	Capacitor, 4.5 MFD, 25V
37	C3, C6-C13, C17, C81	E-00586-0085	Capacitor, .01 MFD, 25V
38	C79, C41-C67	E-00586-0083	Capacitor, 470 PFD, 50V
39	C19-C31, C78, C33-C40	E-00586-0082	Capacitor, 390 PFD, 50V
40	C1, C2, C68-C77	E-00586-0084	Capacitor, 820 PFD, 50V
41	C32	E-00586-0077	Capacitor, 3000 PF, 1kv
43	Q5	E-00585-0023	Transistor PNP (MPS-3702)
44	Q1, Q2	E-00585-0031	Transistor (2N3904)
47	CR44	E-00587-0006	Diode (IN4004)
48	CR1-CR7, CR11-CR43, CR45-CR49	E-00587-0014	Diode (IN4148)
49	CR8	E-00679	LED (Green)
50	VR1	E-00598-0008	Diode Zener (8.2V, IN9598)
52	L1, L2	E-00604-0003	Inductor, 22 Micro Hy.
53	U12	E-00620-0004	Timer (555)
54	U19	E-00620-0005	Quad 2 Input (4011)
55	U9	E-00620-0028	MPU I.C. (6800)
56	U10, U11	E-00620-0029	PIA I.C. (6820)
57	U7	E-00620-0030	RAM I.C. (6810)
59	U20	E-00620-0032	HEX Buffer I.C. (14502B)
60	U14, U18	E-00620-0033	HEX Inverter (4049B)
61	U15	E-00620-0034	Quad Memory Drive (MC3459L)
62	U16	E-00620-0035	Dual Monostable (9602)
64	U17	E-00620-0041	Quad 2 Inputs (74L00N)
65	U8	E-00620-0042	RAM (C MOS, P5101L-3)
68	BT1, BT2, BT3	E-00628-0003	Battery
70	S33	E-00658-0001	Push Button Switch
71	S1-S8, S9-S16, S17-S24, S25-S32	E-00677	DIP Switch
73		E-00712	24 Pin Socket
74		E-00712-0001	40 Pin Socket
75		E-00712-0003	22 Pin Socket
77	J2	E-00715	15 Pin Wafer Connector
78	J1	E-00715-0004	28 Pin Wafer Connector
79	J3, J5	E-00715-0017	16 Pin Wafer Connector
80	J4	E-00715-0018	19 Pin Wafer Connector
81	J5	E-00715-0024	17 Pin Wafer Connector

### NOTE 1:

When ordering, fill in dash number. For example, AS-2962-0: LOST WORLD, AS-2962-2: SIX MILLION DOLLAR MAN, AS-2962-3: PLAYBOY, AS-2962-4: VOLTAN, AS-2962-5: SUPERSONIC, AS-2962-6: STAR TREK, AS-2962-7: KISS, AS-2962-8: PARAGON, AS-2962-9: GROUND SHAKER, AS-2962-10 HARLEM GLOBETROTTERS, AS-2962-12: DOLLY PARTON, AS-2062-13: SILVERBALL MANIA, AS-2962-16: ROLLING STONES

### NOTE 2: Order replacement memory chips U1-U6, specifying game, socket and part number stamped on chip.

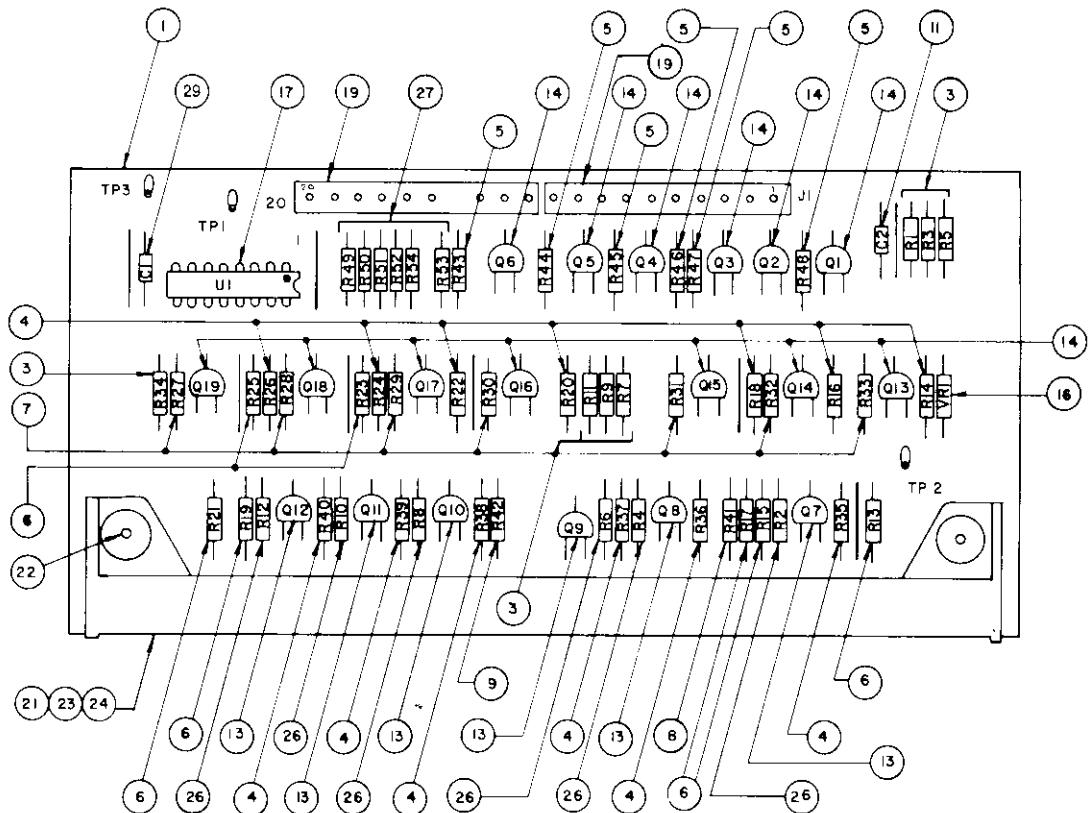
# AS-2518-23 LAMP DRIVER MODULE



## A5: LAMP DRIVER MODULE COMPONENT PARTS LIST

ITEM	REFERENCE DESIGNATION	BALLY PART #	DESCRIPTION
1	A5	AS-2518-23	Lamp Driver Module, Complete
2	R71-R79	E-00105-242	Resistor, 20 $\text{k}\Omega$ , 5%, 1/4 W
3	R1-R60, R70	E-00105-0237	Resistor, 2 $\text{k}\Omega$ , 5%, 1/4 W
4	R61-R69	E-00105-0256	Resistor, 2.2M $\Omega$ , 1/4 W
5	C1	E-00586-0065	Capacitor, .01 MFD, 500V
6	Q4-Q7, Q11-Q14, Q18-Q21, Q25-Q32, Q36-Q39, Q43-Q46, Q50-Q53, Q57-Q60	E-00585-0014	SCR, 2N5060
7	Q1-Q3, Q8-Q10, Q15-Q17, Q22-Q24, Q33-Q35, Q40-Q42, Q47-Q49, Q54-Q56	E-00585-0029	SCR, MCR106-1
8	U1-U4	E-00620-0037	I.C., Decoder, 14514B
9	J1, J3	E-00715-0004	28 Pin Wafer Connector
10	J4	E-00715-0024	17 Pin Wafer Connector
11	J2	E-00715-0014	23 Pin Wafer Connector
12	TP1, TP2, TP3	P-05399	Test Clip

# AS-2518-21 DISPLAY DRIVER MODULE

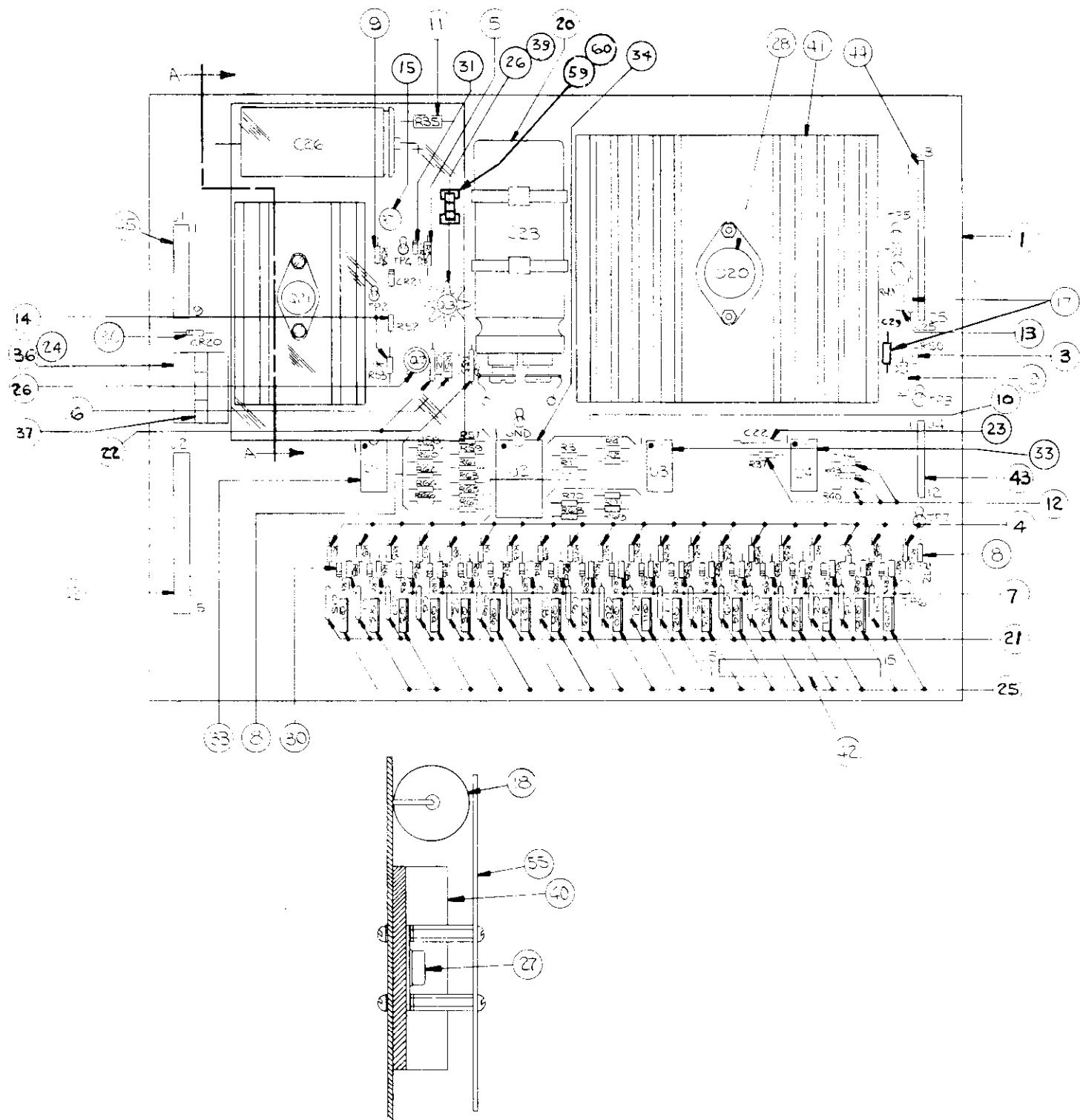


## A1: DISPLAY DRIVER MODULE COMPONENT PARTS LIST

ITEM	QTY.	REFERENCE DESIGNATION	BALLY PART #	DESCRIPTION
1	1		P-2948-296	P.C. Board, M-645-392
3	7	R1, R3, R5, R7, R9, R11, R34	E-105-226	Resistor, 100K $\Omega$
4	13	R14, R16, R18, R20, R22, R24, R26, R35, R36, R37, R38, R39, R40	E-105-227	Resistor, 300K $\Omega$
5	6	R43, R44, R45, R46, R47, R48	E-105-228	Resistor, 9.1K $\Omega$
6	7	R13, R15, R17, R19, R21, R23, R25	E-105-229	Resistor, 1.5K $\Omega$
7	7	R27, R28, R29, R30, R31, R32, R33	E-105-230	Resistor, 1K $\Omega$
8	1	R41	E-105-231	Resistor, 39K $\Omega$
9	1	R42	E-105-271	Resistor, 240K $\Omega$
10				
11	1	C2	E-586-65	Capacitor, .01 MFD, 500V
13	6	Q7, Q8, Q9, Q10, Q11, Q12	E-585-32	Transistor (2N5401)
14	13	Q1, Q2, Q3, Q4, Q5, Q6, Q13, Q14, Q15, Q16, Q17, Q18, Q19	E-585-33	Transistor (MPS-A42)
16	1	VR1	E-598-7	Zener Diode, 110V
17	1	U1	E-620-38	I.C. Decoder
18				
19	2	J1	E-715-34	10 Pin Wafer Pin Connector
21	1	DS1	E-680	Digital Display Panel
22	2		M-1836	Hi-Lo Screw, W/H
23	1		P-2399	Display Mounting (Top)
24	1		P-2399-1	Display Mounting (Bottom)
26	6	R2, R4, R6, R8, R10, R12	E-105-287	Resistor, 2.2K $\Omega$
27	6	R49, R50, R51, R52, R53, R54	E-105-242	Resistor, 20K $\Omega$
28	As Req'd			Wire Jumper
29	1	C1	E-586-85	Capacitor, .01 MFD, 25V

NOTE: INTERCHANGEABLE WITH AS-2518-15

AS-2518-22 SOLENOID DRIVER/VOLTAGE REGULATOR MODULE



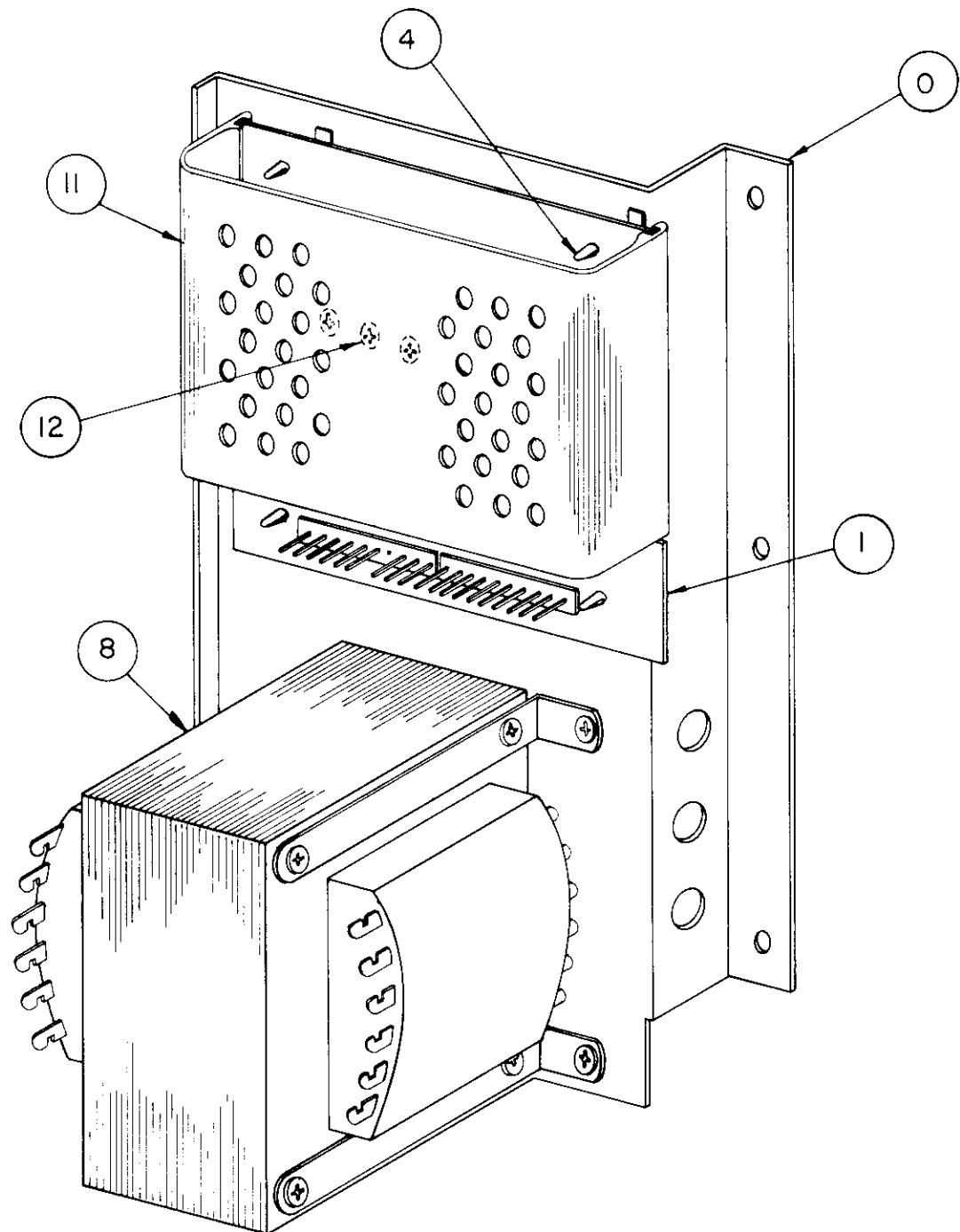
NOTE: INTERCHANGEABLE WITH AS-2518-16

## A3: SOLENOID DRIVER/VOLTAGE REGULATOR MODULE

### COMPONENT PARTS LIST

ITEM	REFERENCE DESIGNATION	BALLY PART #	DESCRIPTION
1	A3	AS-2518-22	Solenoid Driver/Voltage Regulator Module, Complete
3-14	Resistors		Resistor, See Schematic for value.
15	RT1	E-00599-0014	Pot. (Linear) 25K
17	C25, 29	E-00586-0014	Capacitor, .1 MFD, 20V
18	C26	E-00586-0059	Capacitor, 160 MFD, 350V
19	C24	E-00586-0063	Capacitor, 2 MFD @ 25V
20	C23	E-00586-0062	Capacitor, 11700 MFD, 20V
21	C1-C8, C11-C21	E-00586-0064	Capacitor, .002 MFD, 1kv
22	C27, C28	E-00586-0065	Capacitor, .01 MFD, 500V
24	K1	E-00146-0795	Relay, Printed Circuit
25	Q1-Q19	E-00585-0034	Transistor, SE9302
26	Q22, Q23	E-00585-0041	Transistor, 2N3440
27	Q21	E-00585-0042	Transistor, 2N3584
28	Q20	E-00710	-5V Regulator, LAS1405 or 78H05KC or LM323K
30	CR1-CR21	E-00587-0015	Diode (IN4004)
31	VR1	E-00598-0010	Diode, Zener 140V, IN5275A
33	U1, U3, U4	E-00681	I.C. Transistor Array, CA3081
34	U2	E-00620-0039	I.C. Binary to 1/16 Decoder, 74L154
36		E-00592-0002 *	Relay Socket
37		M-1839*	Relay Holder
39		E-00682	Heat Sink, TO5
40		E-00682-0001	Heat Sink, TO66
41		E-00682-0002	Heat Sink, TO3 Case
42		E-00715-0039	15 Pin Wafer Connector
43		E-00715-0016	12 Pin Wafer Connector
44		E-00715-0020	25 Pin Wafer Connector
45		E-00715-0033	9 Pin Wafer Connctor
55		M-1838	Shield-Plexiglass
59		E-00148-0021	Fuse Clips
60	F1	E-00133-0029	Fuse 8 AG-3/16 Amp.
23	C22	E-00586-0085	Capacitor, .01 MFD, 25V

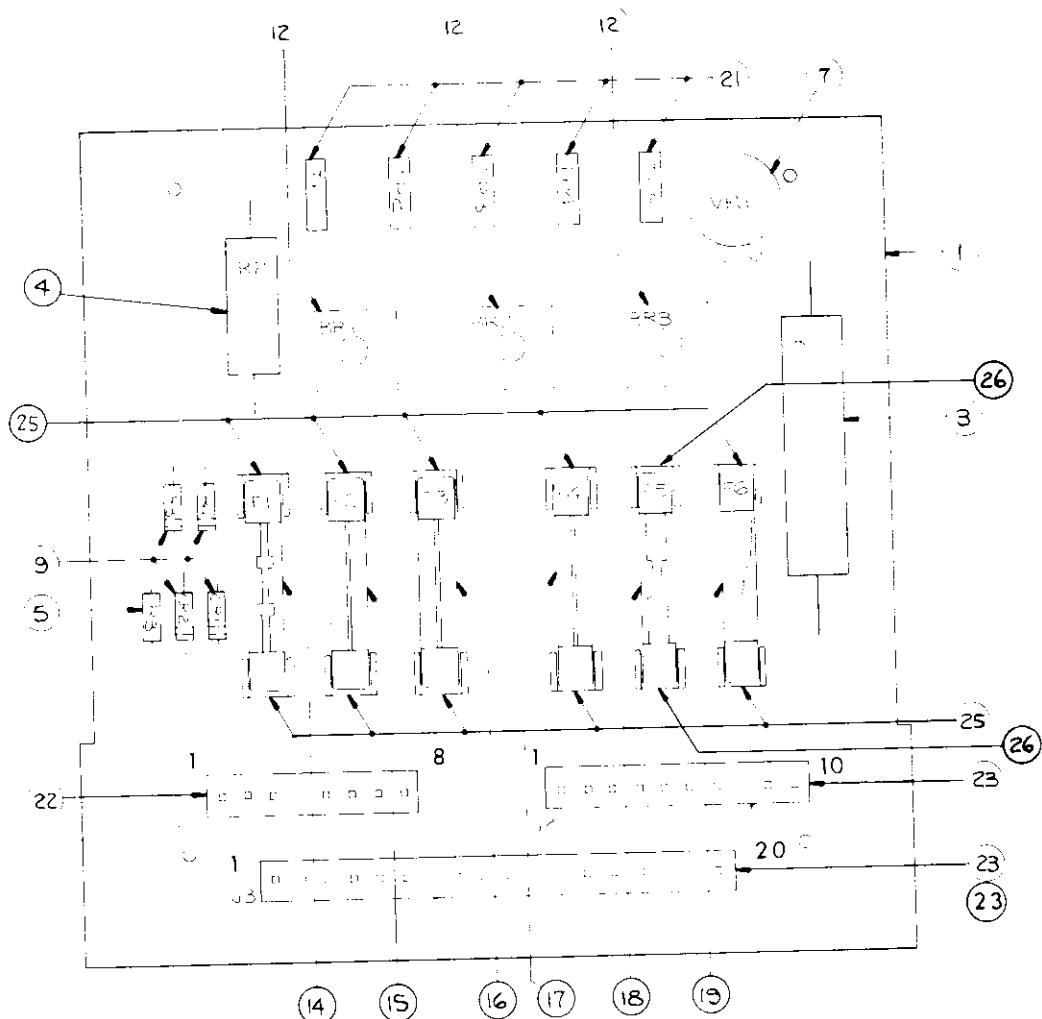
\*USED WITH ITEM 24, E-00146-0791, PLUG IN RELAY ONLY



## A2: POWER TRANSFORMER MODULE COMPONENT PARTS LIST

ITEM	REFERENCE DESIGNATION	BALLY PART #	DESCRIPTION
0	A2	AS-2877-1	Power Transformer Module, Complete
1		AS-2518-18	Rectifier Board Assembly
4		M-1829-2a	Circuit Board Support (4 Req'd.)
8		E-00122-0125c	Transformer 120/240V, 50/60 Hz
11		P-2692b	P.C.B Cover
12		M-1834	Heat Sink Compound

**AS-2518-18 RECTIFIER BOARD ASSEMBLY**



**RECTIFIER BOARD ASSEMBLY  
(Part of)  
A2: POWER TRANSFORMER MODULE  
COMPONENT PARTS LIST**

ITEM	REFERENCE DESIGNATION	BALLY PART #	DESCRIPTION
1	P/O A2	AS-2518-18	Rectifier Board Assembly. Complete
3	R1	E-00104-0092	Resistor, 10%, 600 Ohm, 10W
4	R2	E-00104-0091	Resistor, 25 Ohm, 5W
5	R3	E-00105-0226	Resistor, 5%, 100K Ohm, 14W
7	VR1	E-00623	Varistor
9	CR1, CR2, CR3, CR4	E-00587-0006	Diode (IN4004)
12	BR1, BR2, BR3	E-00602-0003	Bridge Rectifier (VJ248 VARO)
14	F1	E-00133-0010	Fuse, 10A, 32V, 3AG
15	F2	E-00133-0028	Fuse, 3/4A, 250V, 3AG.
16	F3	E-00133-0004	Fuse, 4A, 32V, 3AG
17	F4	E-00133-0005	Fuse, 5A, 32V, 3AG
18	F5	E-00133-0027	Fuse, 20A, 32V, 3AG
19	F6	E-00133-0024	Fuse, 3A, 3AG, S.B.
21		E-00684	Test Point
22	J1,	E-00715-0032	8 Pin Wafer Connector
23	J2, J3	E-00715-0034	10 Pin Wafer Connector
25		E-00148-0021	Fuse Clips
26		E-00148-0022	Fuse Clips

## A8: SOUND MODULE COMPONENT PARTS LIST

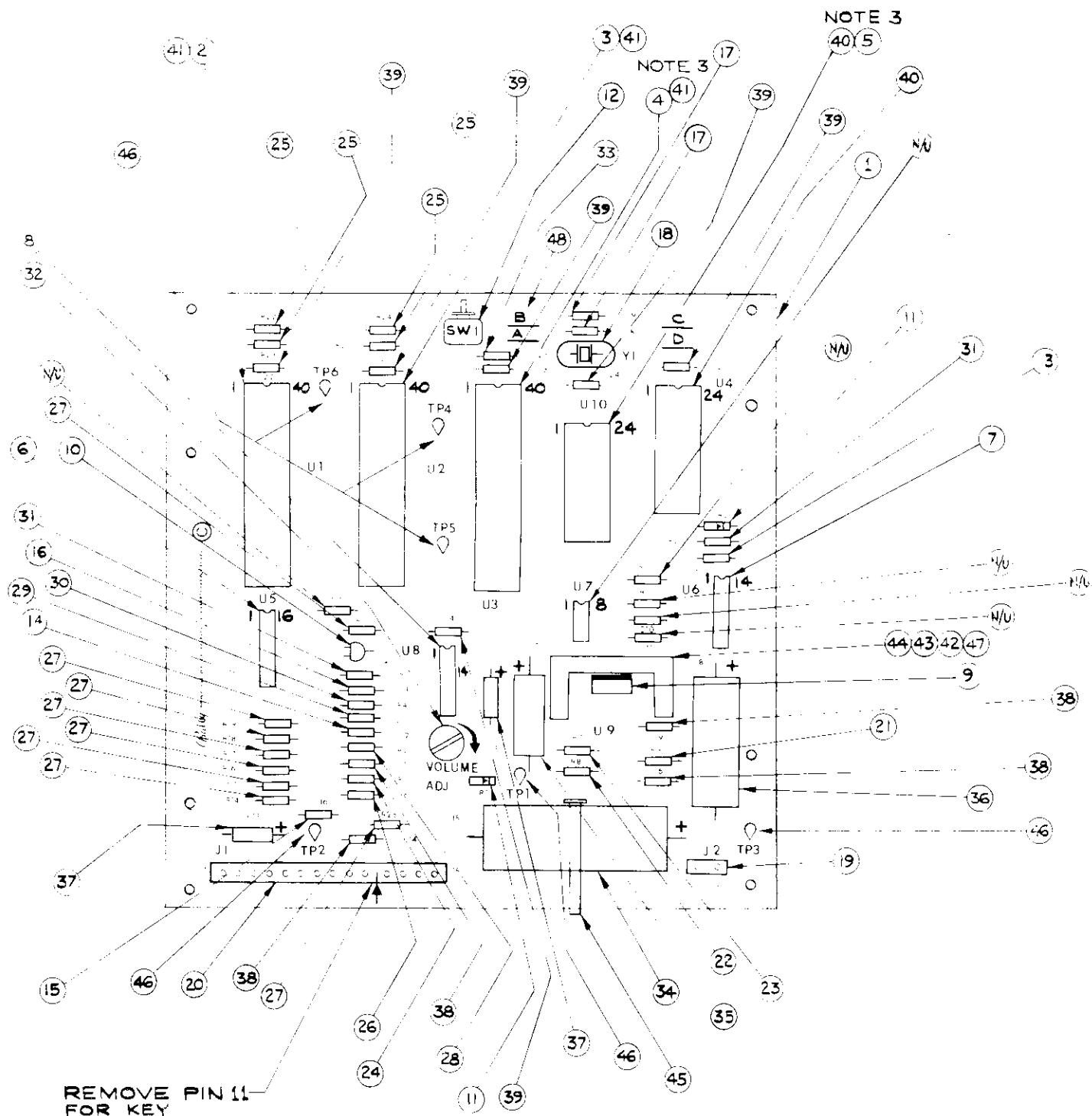
ITEM	REFERENCE DESIGNATION	BALLY PART NO.	DESCRIPTION
1	A8 (see note 1)	AS-3022-5	PWB Module Complete
2	U1	E-620-124	Sound Chip AY-3-8910
3	U2	E-620-29	PIA, 6820/21
4	U3	E-620-125 (E620-128)	CPU, 6808 (6802 Note 3)
5	U10	E-620-30	Ram, 6810 (Note 3)
6	U5	E-620-33	Hex Inverter 4049B
7	U6	E-620-5	Quad 2 Input 4011B
8	U8	E-620-126	Amp, LM3900
9	U9	E-620-127	Power Amp, TDA 2002
10	Q1	E-585-31	Transistor, 2N3904
11	CR1, 2	E-587-6	Diode, 1N4004
12	SW1	E-658-1	Switch
13	C12	E-586-118	Cap. .2MF $\pm 20\%$ Y5P, 16 V.
14	C2	E-586-130	Cap. .47 $\pm 20\%$
15	C16	E-586-83	Cap. 470 PF 50 V.
16	C3	E-586-120	Cap. 68 PF, $\pm 20\%$ 1K
17	C18, 19	E-586-121	Cap. 27 PF, $\pm 20\%$ 1K
18	Y1	E-744-5	Crystal, 3.579545 MHZ
19	J2	E-736-2	Connector, Wafer, 2 Pin KK156
20	J1	E-736-15	Connector, Wafer, 15 Pin KK156
21	R9	E-105-196	Resistor, 1 Ohm, $\frac{1}{4}$ W., 5%
22	R8	E-105-211	Resistor, 2.2 Ohm, $\frac{1}{4}$ W., 5%
23	R7	E-105-303	Resistor, 220 Ohm, $\frac{1}{4}$ W., 5%
24	R1	E-105-230	Resistor, 1 K, $\frac{1}{4}$ W., 5%
25	R21, 22, 23, 24	E-105-238	Resistor, 3.3K. Ohm, $\frac{1}{4}$ W., 5%
26	R6	E-105-239	Resistor, 4.7K., $\frac{1}{4}$ W., 5%
27	R3, 14, 15, 16, 17, 18, 19, 25	E-105-185	Resistor, 10K.. $\frac{1}{4}$ W., 5%
28	R2	E-105-245	Resistor, 30K.. $\frac{1}{4}$ W., 5%
29	R10	E-105-252	Resistor, 180K.. $\frac{1}{4}$ W., 5%
30	R4	E-105-225	Resistor, 200K.. $\frac{1}{4}$ W., 5%
31	R5, 20	E-105-285	Resistor, 1M, $\frac{1}{4}$ W., 5%
32	RT1	E-599-16	Potentiometer 1K
33	C23	E-586-122	Cap. .001 $\pm 20\%$ 2SF
34	C15	E-586-123	Cap. 4700 MF @ 25 V.
35	C7	E-586-124	Cap. 470 MF @ 6.3 V
36	C8	E-586-129	Cap. 470 MF @ 16 V.
37	C5, 13	E-586-90	Cap. 1 MF @ 50 V.
38	C9, 1, 14, 6	E-586-89	Cap. .1 MF
39	C4, 22, 17, 21, 20, 24	E-586-85	Cap. .01 MF
40	XU10, XU4	E-712	Socket, 24 Pin
41	XU1, XU2, XU3	E-712-1	Socket, 40 Pin
42	Used with 43	LSPR-00632-1106	Bolt, 6 x 32 x $\frac{3}{8}$
43	Used with 42	N-00632-2112	Nut, 6 x 32
44	H.S for U9	E-682-8	Heat Sink, 6030BTT
45	Used with C15	E-647-5	Ty Rap
46	TP1, 2, 3, 4, 5, 6	P-5399	Test Point
47	Use with 44, 9	M-1834	Thermal Grease
48	Jumper, B	W-1211c	22 AWG Wire, Solid Tinned Schematic

NOTE 1: When ordering specify name of game.

NOTE 2: Order replacement memory chip U4 specifying name of game and part no. stamped on chip.

NOTE 3: When using item 4, 6808 you must use item 5, 6810 and the "B" jumper. When item, 6802 is available delete item 5 and use "A" jumper.

# AS-2518-51 SOUND MODULE



## ATTACHMENT II: INSTRUCTION MANUAL

Female insulation displacement connectors are used in the backbox cable harnesses. These connectors can be identified by the side entry of the leads and by their black, plastic covers.

The mating, white, male connectors on the Sound, Solenoid Driver and Transformer modules have .156" center to center spacing. Two pin lengths are in use. This, and all current games have a .450" length. Older games have a .640" length.

During servicing, when mating insulation displacement connectors on male connectors with a .640" pin length:

1. Hold the female connector parallel to the module surface.
2. Carefully align the openings in the female with the male pins.
3. Mate the connector set firmly but gently while maintaining the parallel relationship.
4. As resistance is encountered, stop applying force. An air gap of about .150" between the male and female connector bodies is normal at complete engagement.

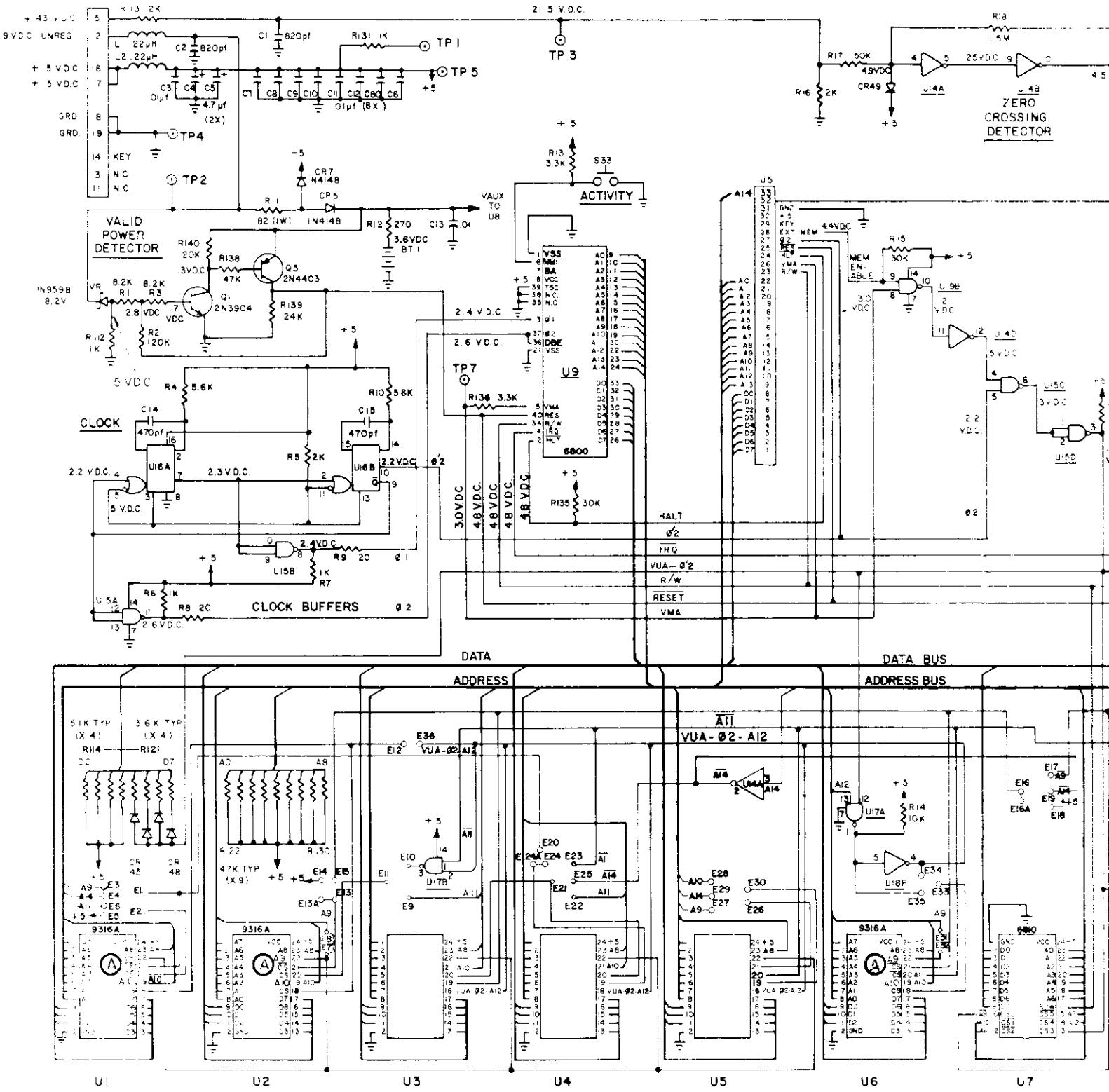
**CAUTION:** It is not necessary or advisable to force the female connector further onto the male pins. Doing so may cause an intermittent connection.

When mating insulation displacement connectors on male connectors with a .450" pin length:

1. Follow steps 1-4 above, but—
2. Disregard the **CAUTION** note. Also, no air gap exists between the connector pair on total engagement.

5-1 27/6  
6-7 27/6

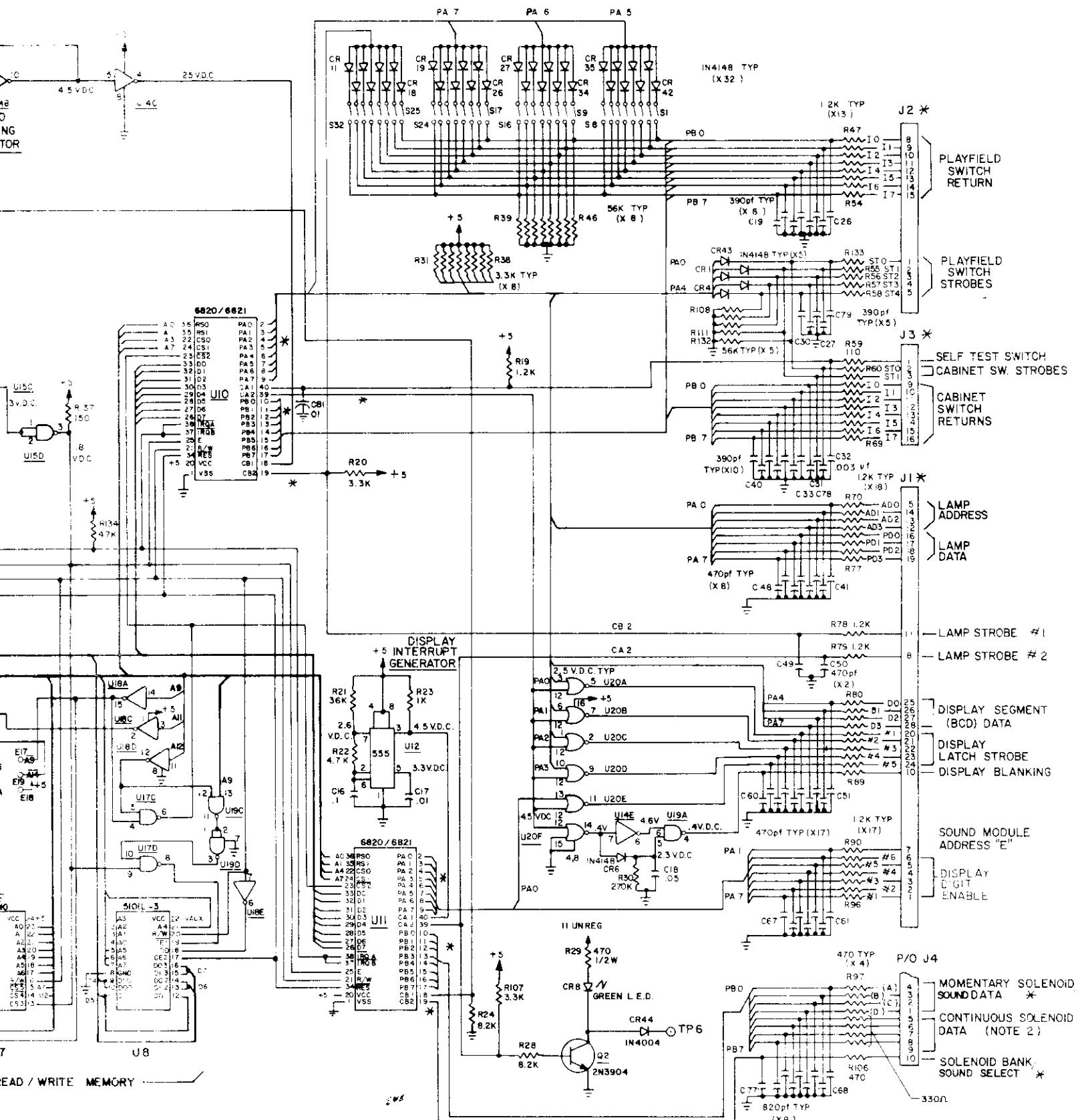
P/O J4



READ ONLY MEMORY  
(NOTE 4)

## NOTES

1. \* INDICATES "AID" TEST POINT.
2. REMOVE A3J4 BEFORE USING AS AID TEST POINT
3. PREFIX ALL REFERENCE DESIGNATIONS WITH "A4"
4. EXACT CHIP COMPLEMENT USED IN SOCKETS U1 THRU U6 CAN VARY FOR DIFFERENT GAMES AND PRODUCTION LOTS  
TABLES OF MEMORY CHIPS AND CORRESPONDING JUMPERS FOR DIFFERENT GAMES AVAILABLE FROM  
BAUDI FIELD SERVICE DEPARTMENT.

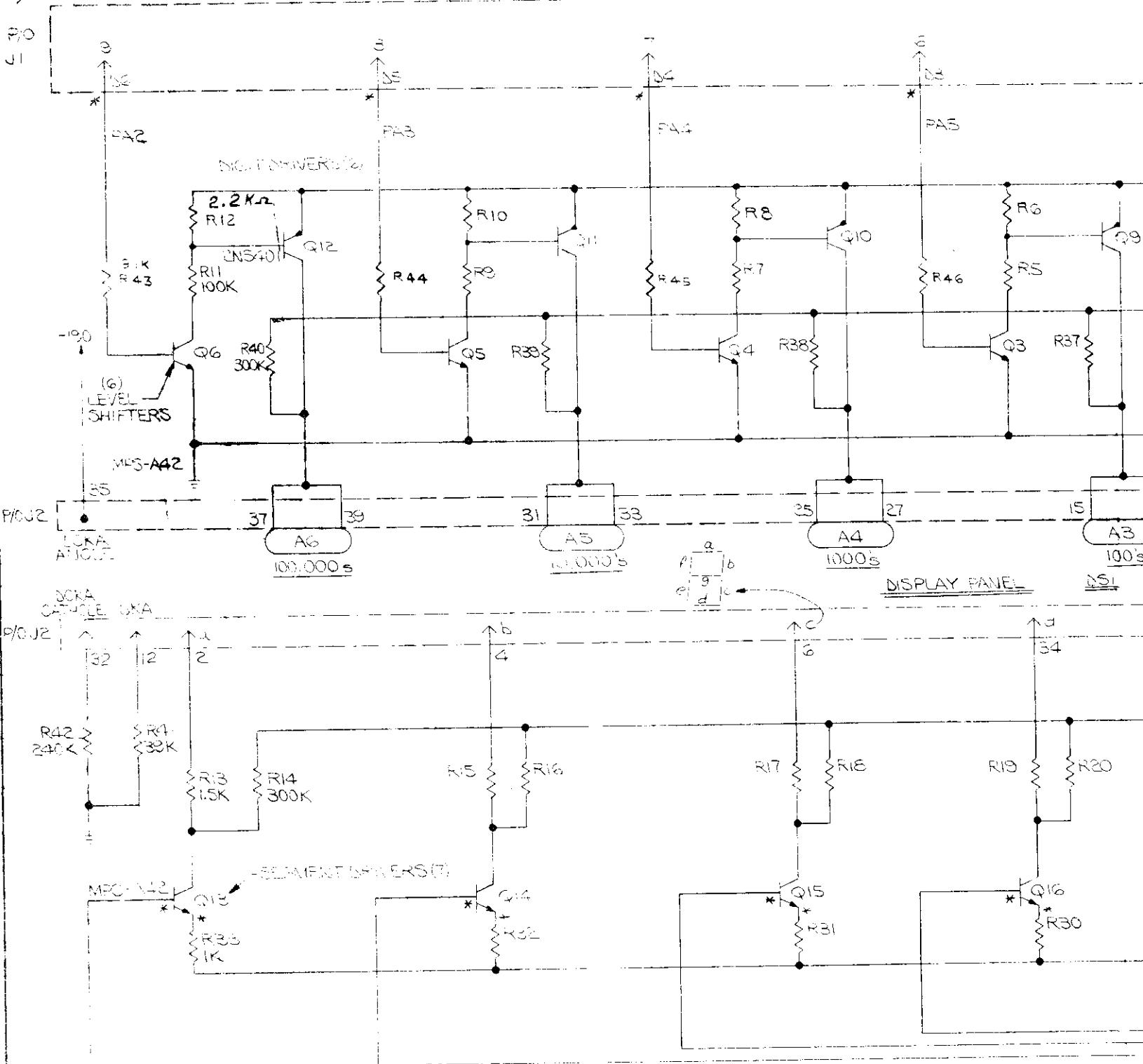


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CHICAGO, ILLINOIS

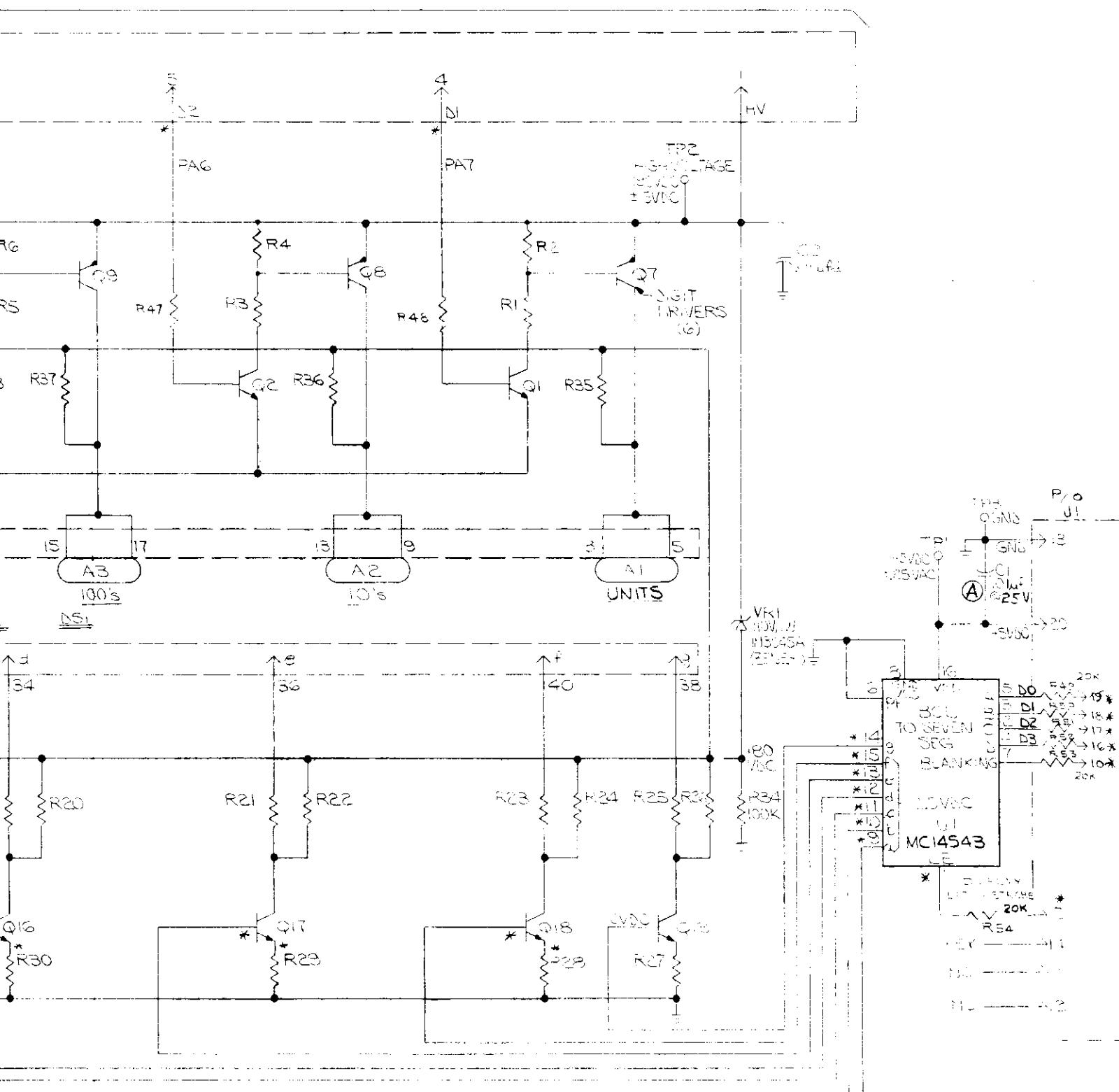
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DISPLAY DIGIT ENABLE



NOTES:

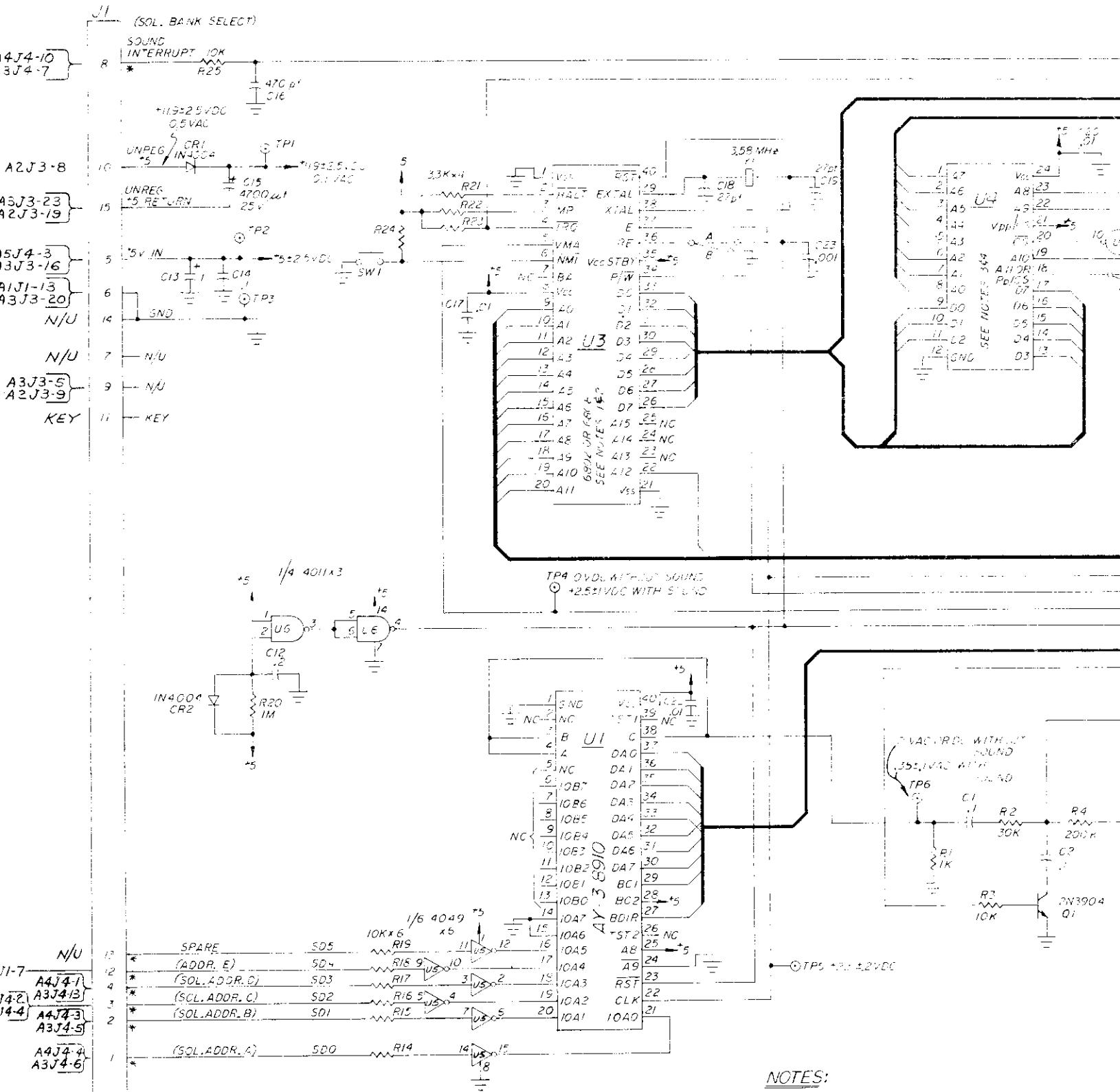
1. LESS OTHERWISE SPECIFIED ALL RESISTORS ARE  $\pm 5\%$ , 1/4W.
2. PREFIX ALL PREFERENCE DESIG. WITH ASSEMBLY REFERENCE DESIG. "A"
3. \* INDICATES 'A/D' TEST POINT.

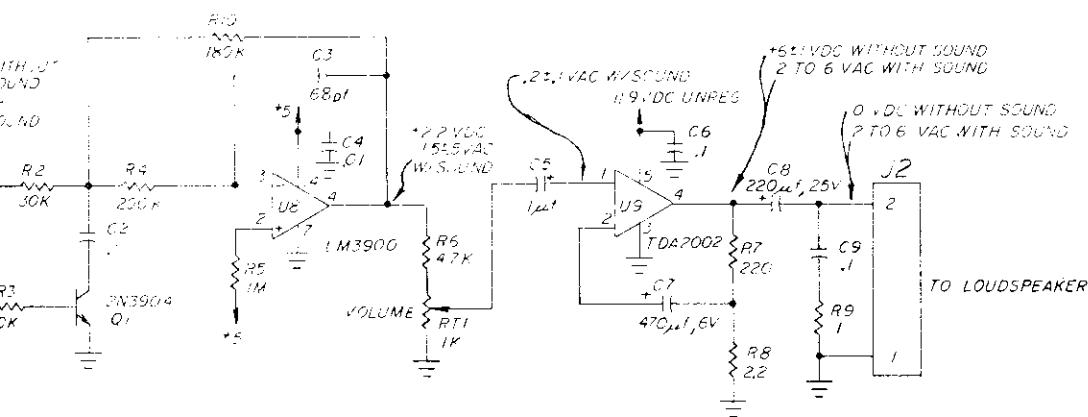
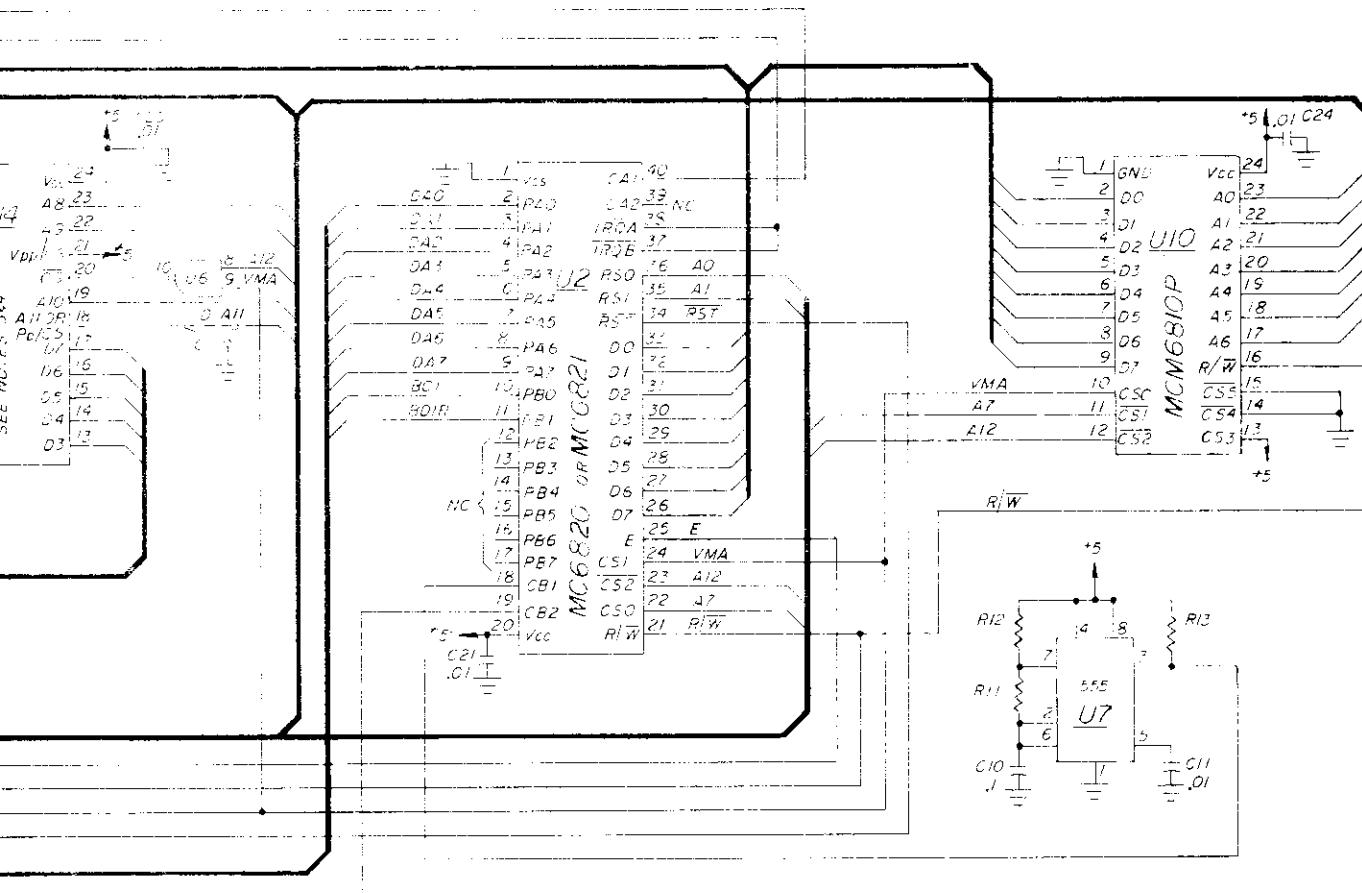


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REMOVE ALL BURRS				DL. I. T. DATE		
				CK. BY DATE		
TOLERANCES ON DIMENSIONS UNLESS OTHERWISE SPECIFIED. FRACTIONS + DECIMALS - ANGLES +				APR. BY DATE	PRINT. CONTROL	PRINT. DATE
				AM'D BY DATE	12/14/74	12/14/74
				FINISH:	12/14/74	12/14/74
				HARDENING:	12/14/74	12/14/74
				NAME: <i>Bally</i> MANUFACTURING CORP #111		
				2640 BELMONT AVENUE		922
				CHICAGO, ILLINOIS		NOVELTY
				ASSEM. NO. USED ON		
				DISPLAY BOARD SCHEMATIC A		AS-2518
				MATERIAL		PART NO.
						W-1184

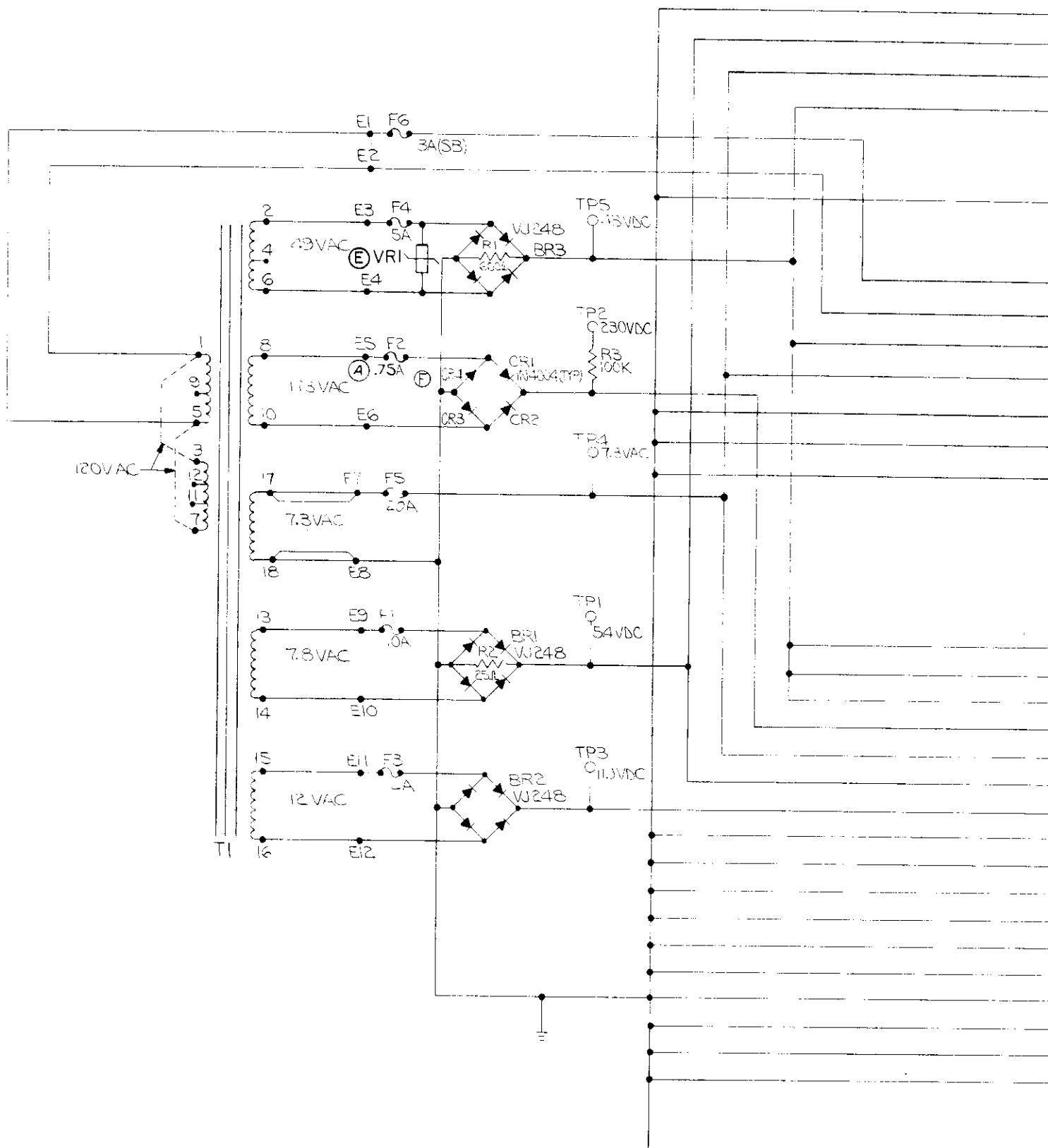
I	A	WAS 500V	4/4/74	T.D.
NO.	LET.	CHANGE	DATE	BY

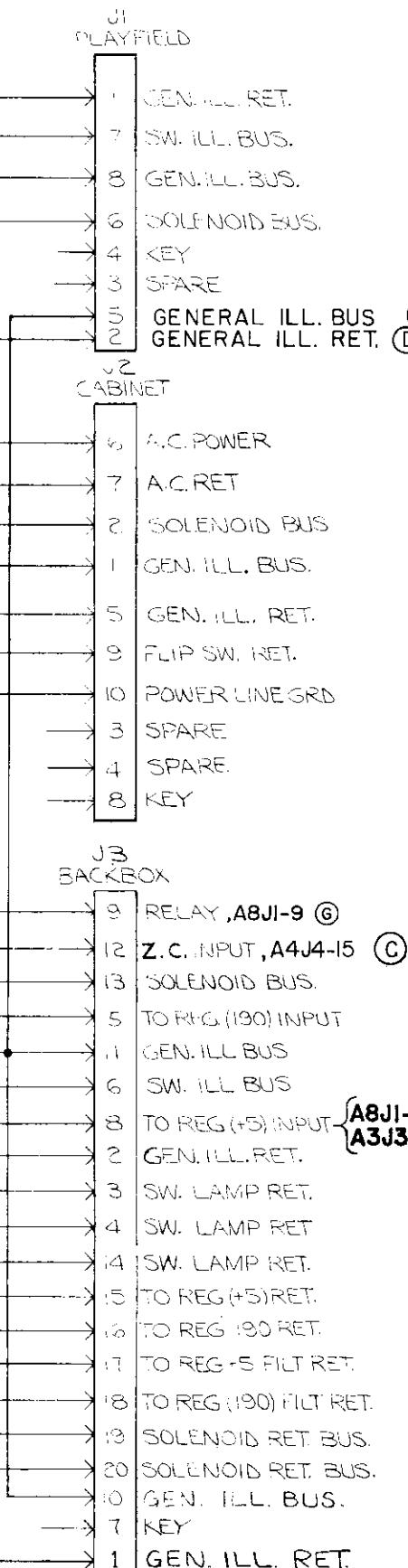




16K RAM IS USED (6802 WITHOUT U10)  
16K (6808/6812, U10).  
(EPROM) (6193168 INTEL 2716 OR EQUIV.).  
(T1 TMS 2532 TMS 4732 OR EQUIV.).  
T USED ON THIS ASSEMBLY.  
ATED, ALL RESISTOR VALUES ARE IN OHMS,  
RE IN MMFD'S.  
E SIGNATIONS WITH A8.  
DINT.

TRANSFORMER ASSEMBLY A2





## NOTES:

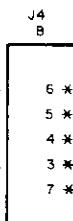
1. WIRE A.C. POWER AND TERMINALS PER TABLE 1.
2. VOLTAGES SHOWN ARE FOR GAME IN POWER-UP CONDITION.
3. PREFIX ALL REFERENCE DESIGNATIONS WITH A2.

TABLE 1 POWER LINE CONNECTIONS		
LINE VOLTAGE VRMS A.C.	APPLY POWER TO TERMINALS	APPLY POWER TO TERMINALS
115	1 TO 3 AND 2 TO 11	1 AND 9
120	1 TO 3 AND 2 TO 7	1 AND 5
220	3 TO 5	1 AND 12
240	3 TO 5	1 AND 7

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NO.	LET.	CHANGE	DATE	BY	CK.	DI	DATE	CK	DATE	PRINT	CONT	END	INCH	TOTAL	SCALE						
6	H	ADDED A8J1-10, A3J3-12	10-179	E.V.	-D	10	4-26	C	2-11-77	FEB 21 1977	2640 BELMONT AVENUE	CHICAGO, ILLINOIS	#	1074	-E						
5	G	ADDED A8J1-9	9-12-79	E.V.	-D	11	4-26	C	2-11-77												
1	F	ERASED (S8)	12-678	JD		12	4-26	C	2-11-77												
3	E	VRI READ B3	11-2-78	NR	DET	13	4-26	C	2-11-77												
2	D	J1-2 READ "GND"				14	4-26	C	2-11-77												
2	C	J3-12 READ "Z.C. INPUT"				15	4-26	C	2-11-77												
1	B	ADDED JUMPER J1-S9-J3-1				16	4-26	C	2-11-77												
1	A	F2 WAS 5.0A				17	4-26	C	2-11-77												
DO NOT SCALE DRAWING						18	4-26	C	2-11-77												
HARDENING:						19	4-26	C	2-11-77												
NAME: <b>Bally MANUFACTURING CORP.</b>										MATERIAL: <b>POWER TRANSFORMER MODULE SCHEMATIC</b>											
ASSEM. NO. USED ON: <b>X</b>										PART NO. <b>W-1185-1</b>											

MOMENTARY  
SOLENOID  
SOLENOID  
BANK  
SELECT



LOW WHEN SELECTED

NOTES:

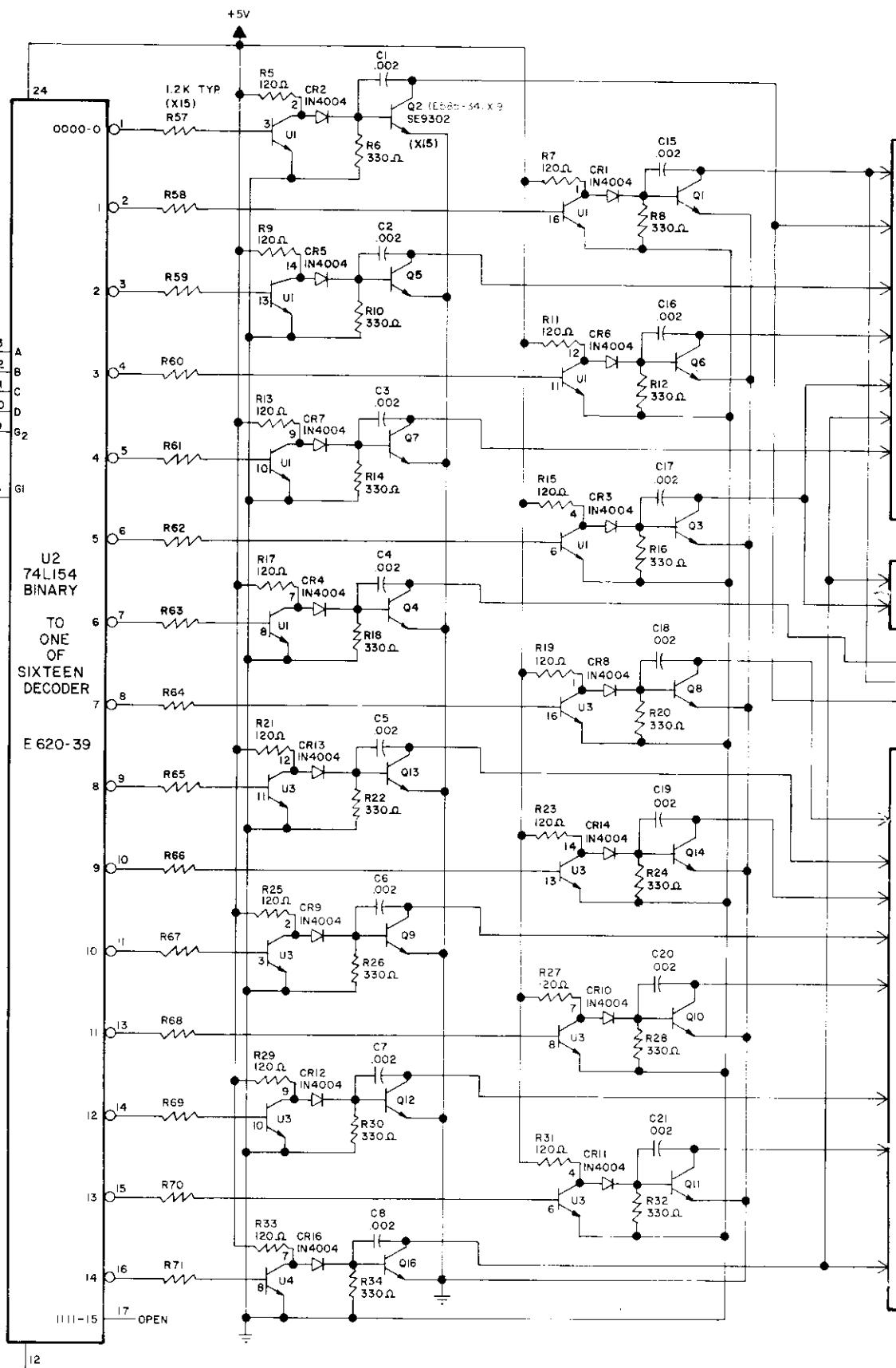
1. E-710, LAMBDA-LAS 1405  
NATIONAL -LM 323 K  
FAIRCHILD 78H05KC
2. J1-KKI56-9 PIN KEY PIN 7  
J2-KKI56-15 PIN KEY PIN 3  
J3-KKI00-25 PIN KEY PIN 2  
J4-KKI00-12 PIN KEY PIN 2  
J5-KKI56-15 PIN KEY PIN 6
3. PREFIX ALL REFERENCE DESIGNATIONS WITH "A3".
4. "UI", "4", "3" PINS 5 AND 15 ARE GROUNDED.
5. VOLTAGES SHOWN ARE FOR A GAME-UP CONDITION.
6. "UI", "U3" AND "U4" ARE CA-308I (E68I)
7. \* INDICATES 'AID' TEST POINT.

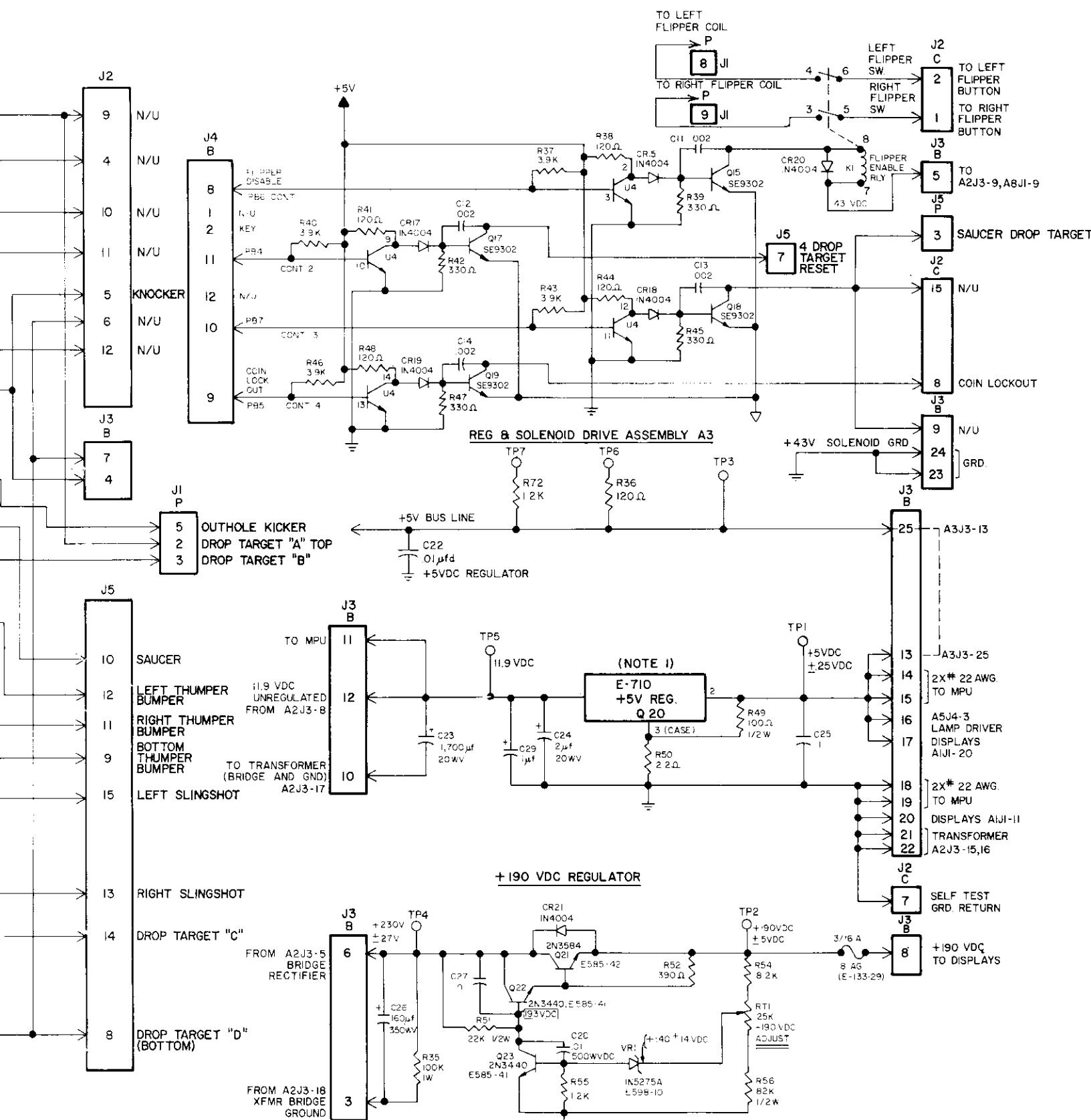
CONNECTOR CODE

C → ROUTE TO CABINET CONN  
B → ROUTE TO BLACK BOX CONN  
P → ROUTE TO PLAYFIELD CONN

LAST NUMBER USED

R72  
C29 N/U C9, C10  
Q23 N/U Q20  
CR21  
VRI





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REMOVE ALL BURRS	DR BY E. V. 1-2-80	DATE 1-2-80
TOLERANCES ON	CK BY DATE	
OTHERWISE SPECIFIED		
FRACTIONS 1/8" 1/4"	AP'D BY T.D. 1-2-80	PRINT CONTROL
DECIMALS .125 .250	DATE 1-2-80	DIE SIZE:
EXCEPT HOLE DIA S		C.C.:
ANGLES 15° 30°	FINISH:	FT PER M.:
		LBS. PER M.:
NAME: SOLENOID DRIVER VOLTAGE REGULATOR SCHEMATIC		
MATERIAL: ROLLING STONES		
NO. L.E.T.	CHANGE	DATE BY
DO NOT SCALE DRAWING		
CODE: W-1183		

Bally MANUFACTURING CORP.

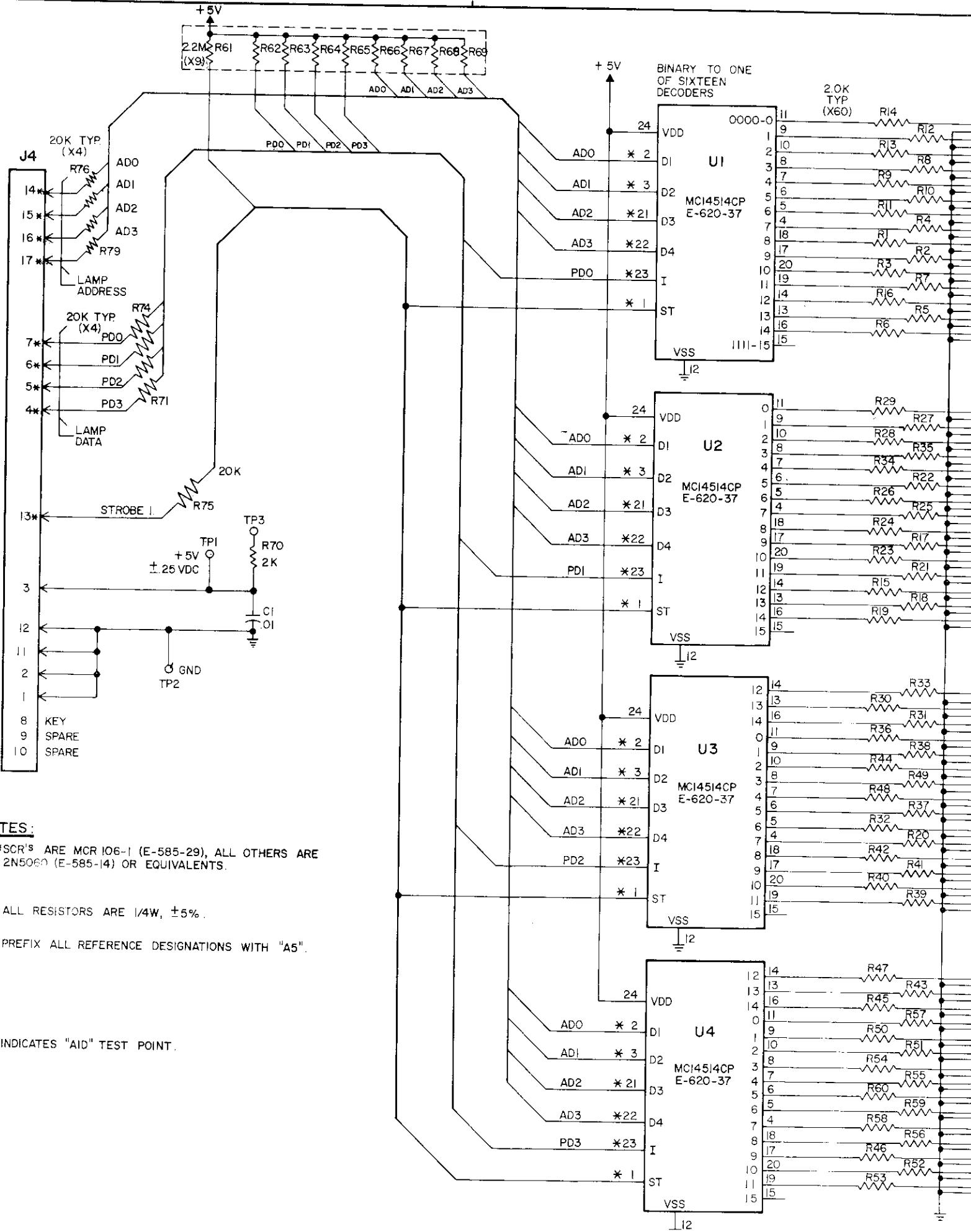
2640 BELMONT AVENUE  
CHICAGO, ILLINOIS

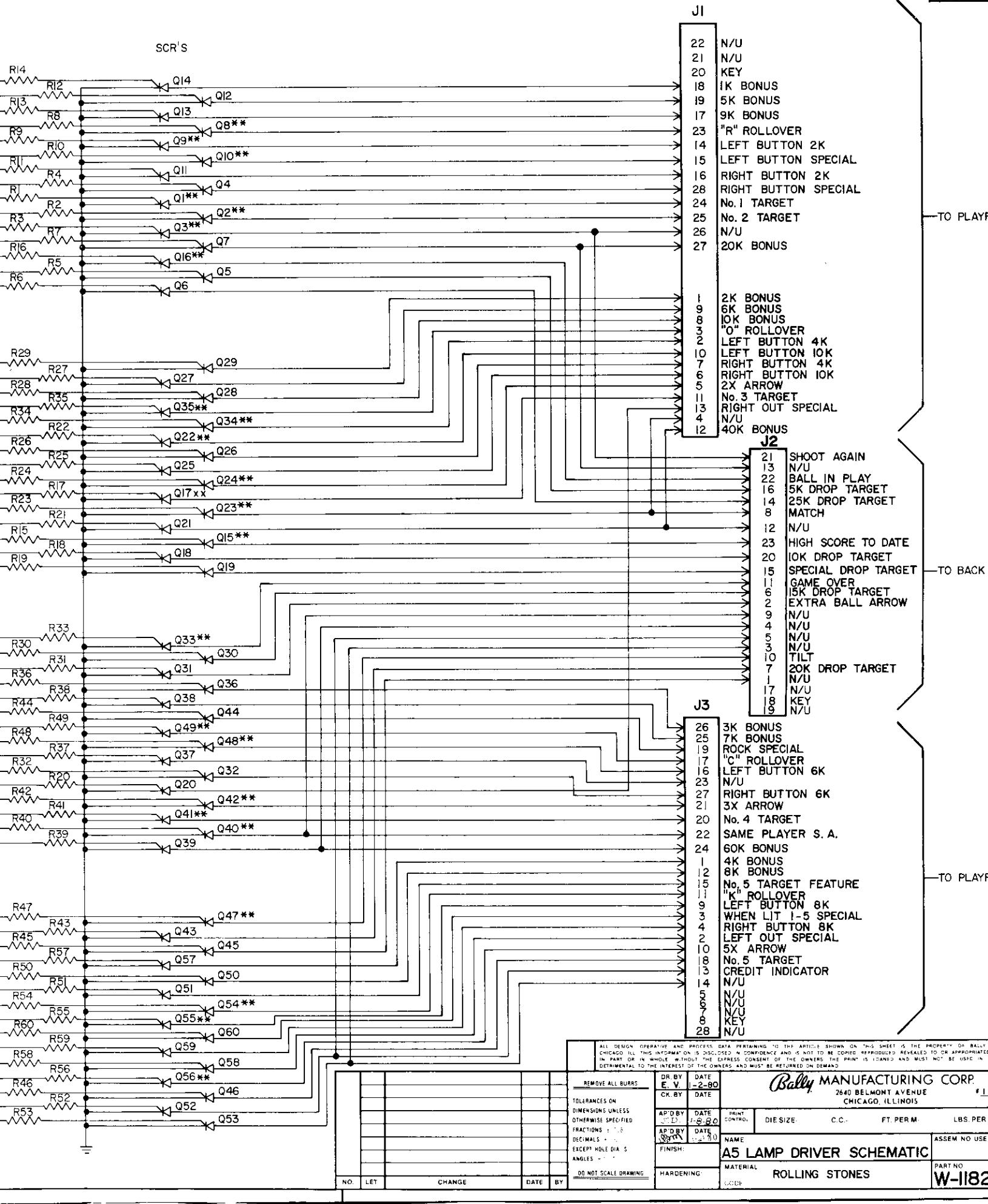
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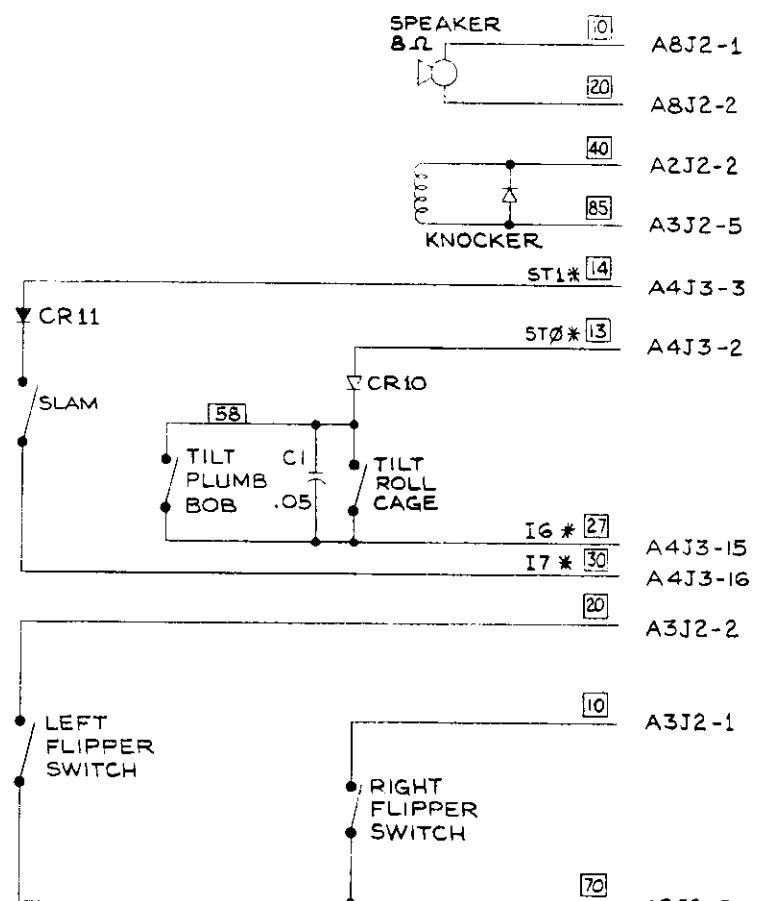
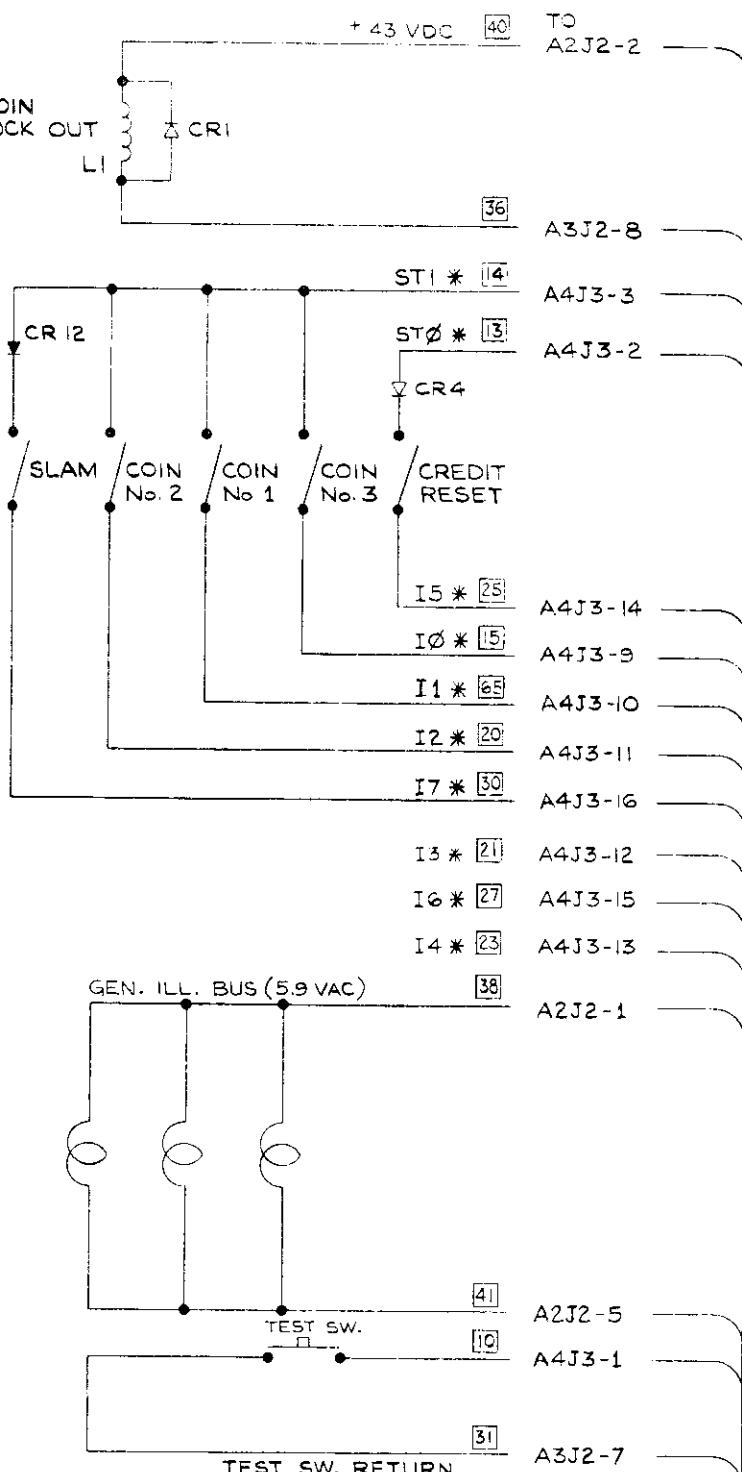
ASSEM. NO. USED

PART NO.

W-1183







TO	J1 PIN	TO	J1 PIN
A4J3-9	1	A4J3-3	11
A4J3-10	2	A2J2-2	15
A4J3-11	3	A3J2-8	16
A4J3-12	4	A2J2-1	17
A4J3-13	5	A2J2-5	18
A4J3-14	6	A4J3-1	19
A4J3-15	7	A3J2-7	20
A4J3-16	8		
A4J3-2	10		

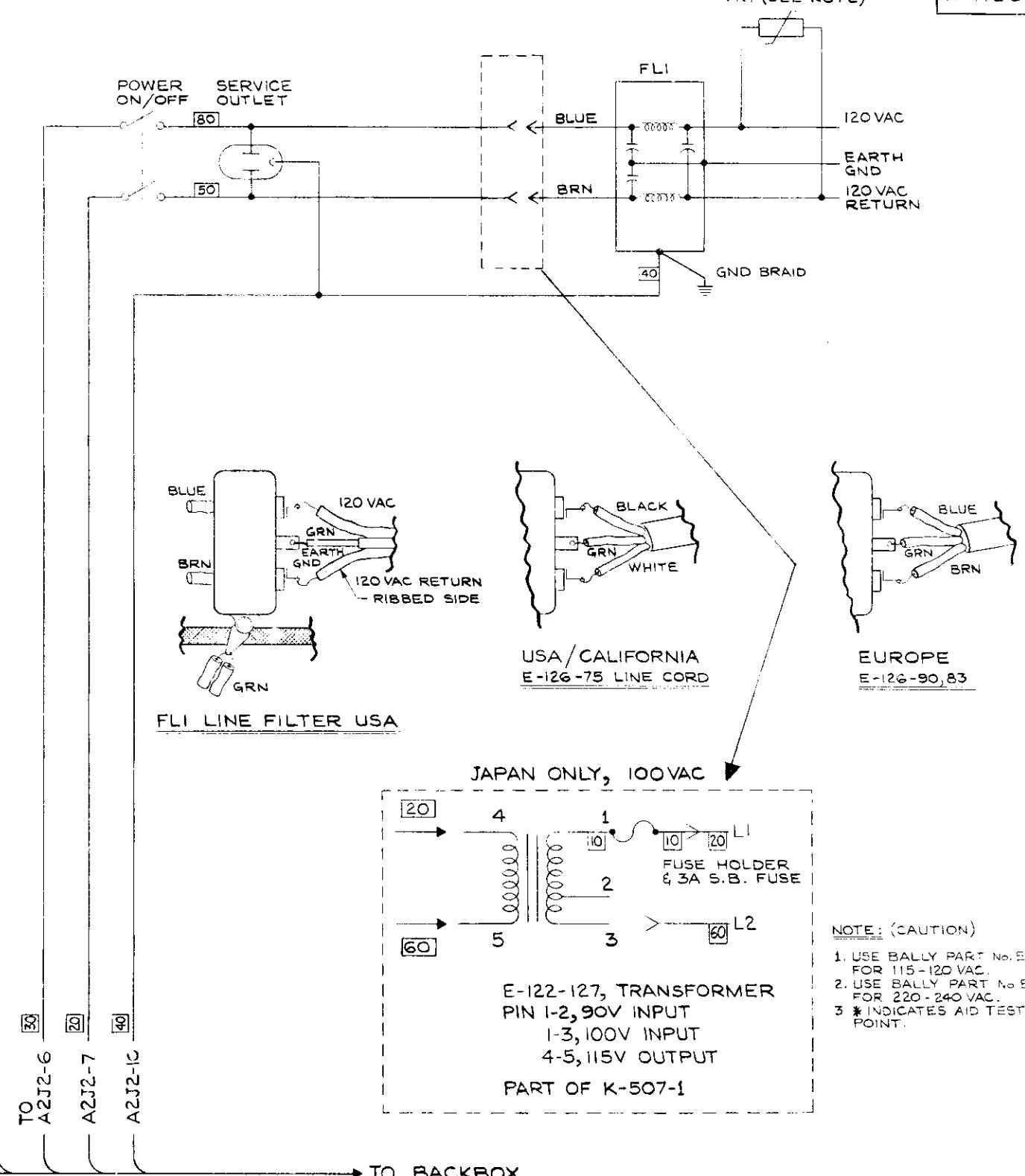
DOOR PLUG

A7 CABINET ASS'Y.

NOTE : - DIODES ARE IN4

VRI (SEE NOTE)

W-1186

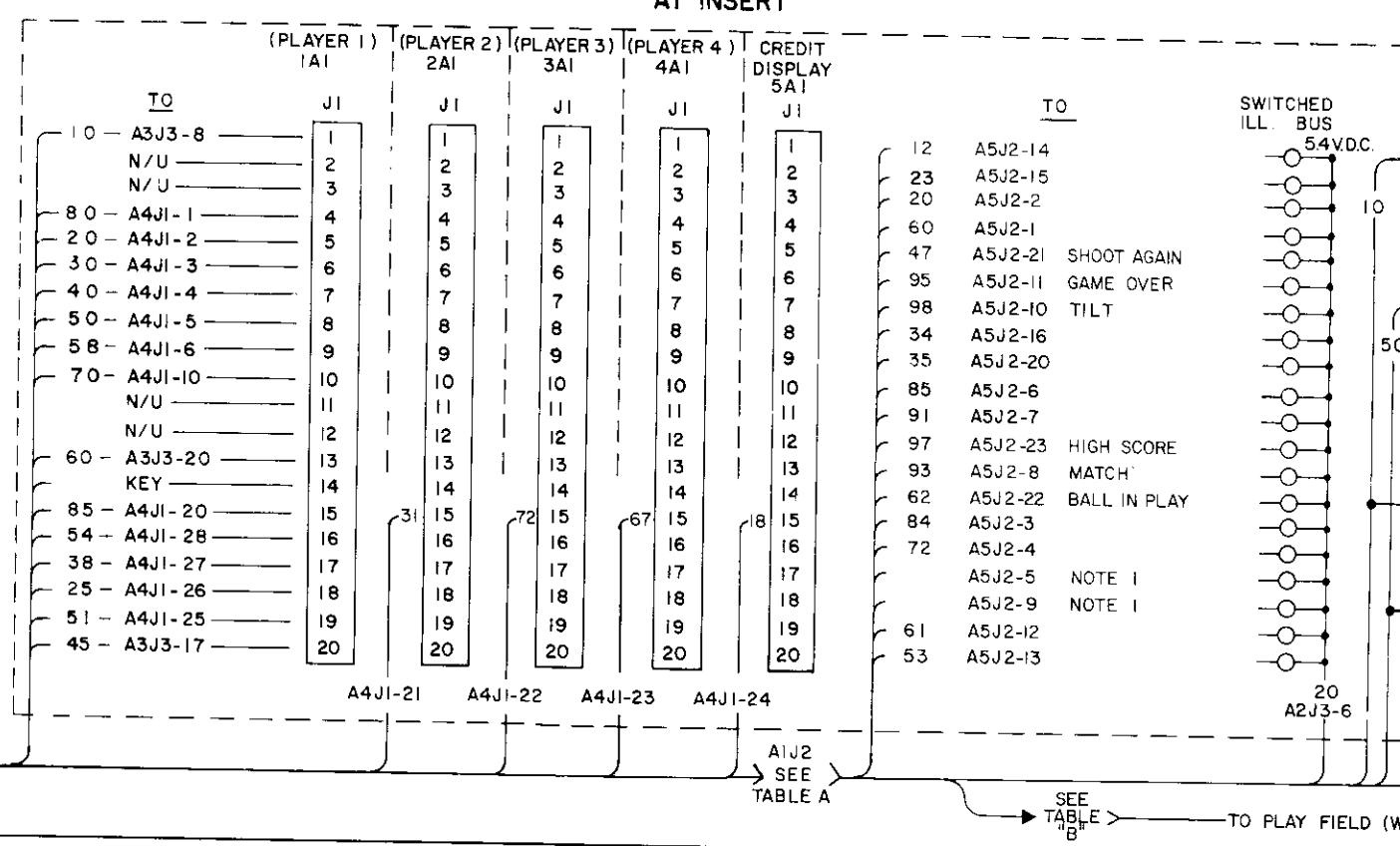


### **BINET ASS'Y, WIRING**

DIODES ARE IN 4004, (E-587-6)

A1 A1J2

ROM	PIN	WIRE
3-6	1	20
2-14	2	12
3-2	3	50
3-11	4	10
2-23	5	97
2-15	6	23
2-22	7	62
2-8	8	93
2-1	9	60
2-2	10	20
2-11	11	95
2-21	12	47
2-10	13	98
2-7	14	91
2-6	15	85
2-20	16	35
2-16	17	34
3-1	18	40
3-10	19	70
2-13	20	53
2-12	21	61
2-4	22	72
2-3	23	84
	24	

INSERT TO BACK CAB.  
PLUG

SEE TABLE B TO PLAY FIELD (W)

## LAMP DRIVER A5

J4	TO	J2	TO	J1	TO	J3	TO	
1 A2J3-4	60	1 N/U	41	1 2K BONUS	10	1 4K BONUS	1 D7	
2 A2J3-3	-20	2 X BALL ARROW	43	2 LEFT BUTTON 4K	95	2 LEFT OUT SPECIAL	2 D6	
3 A3J3-16	-84	3 N/U	45	3 "0" ROLLOVER	81	3 WHEN LIT	3 D5	
4 A4J1-19	-72	4 N/U	35	4 N/U	14	4 I-5 SPECIAL	4 D4	
5 A4J1-18	5	N/U	48	5 2X ARROW	5	N/U	5 D3	
6 A4J1-17	85	6 15K DROP TARGET	25	6 RIGHT BUTTON 10K	6	N/U	6 D2	
7 A4J1-16	91	7 20K DROP TARGET	34	7 RIGHT BUTTON 4K	7	N/U	7 D1	
8 KEY	93	8 MATCH	51	8 10K BONUS	8	KEY	8 D0	
9 N/U	9	N/U	52	9 6K BONUS	15	9 LEFT BUTTON 8K	9 A13	
10 N/U	98	10 TILT	23	10 LEFT BUTTON 10K	91	10 5X ARROW	10 A12	
11 A2J3-14	95	11 GAME OVER	65	11 No.3 TARGET	20	11 "K" ROLLOVER	11 A11	
12 SPARE GND	61	12 N/U	61	12 40K BONUS	21	12 8K BONUS	12 A10	
13 A4J1-11	53	13 N/U	96	13 RIGHT OUT SPECIAL	13	13 CREDIT INDICATOR	13 A9	
14 A4J1-15	12	14 25K DROP TARGET	54	14 LEFT BUTTON 2K	84	14 N/U	14 A8	
15 A4J1-14	23	15 SPECIAL DROP TAR	13	15 LEFT BUTTON	30	15 No.5 TARGET	15 A7	
16 A4J1-13	34	16 5K DROP TARGET	12	16 RIGHT BUTTON 2K	25	16 LEFT BUTTON 6K	16 A6	
17 A4J1-12	17	N/U	57	17 9K BONUS	27	17 "C" ROLLOVER	17 A5	
18 KEY	58	18	18 1K BONUS	56	18 No.5 TARGET	18 A4	18 A4	
19 N/U	60	19 5K BONUS	67	19 ROCK SPECIAL	19 A3	19 A3	19 A3	
35 20	10K DROP TARGET	20	KEY	64	20 No.4 TARGET	20 A2	85	20 A1AI-15
47 21	SHOOT AGAIN	21	N/U	12	21 3X ARROW	21 A1	31	21 2AIJ1-15
62 22	BALL IN PLAY	22	N/U	23	22 SAME PLAYER S.A.	22 A0	72	22 3AIJ1-15
97 23	HIGH SCORE TO DATE	56	23 "R" ROLLOVER	98	23 N/U	23 R/W	67	23 4AIJ1-15
		50	24 No.1 TARGET	72	24 60K BONUS	24 HLT	18	24 5AIJ1-15
		90	25 No.2 TARGET	36	25 7K BONUS	25 RES	51	25 A1J1-19
		91	26 N/U	38	26 3K BONUS	26 VMA	25	26 A1J1-18
		53	27 20K BONUS	40	27 RIGHT BUTTON 6K	27 0	38	27 A1J1-17
		78	28 RIGHT BUTTON SPECIAL	28	N/U	28 EX MEM.	54	28 A1J1-16

J4	TO	J2	TO
15	1 A3J4-3	51	1 ST0 PLAY-FIELD
20	2 A3J4-4	2	2 ST1
21	3 A3J4-5	3	3 ST2 SW
22	4 A3J4-6	4	4 ST3 STROBE
23	5 A3J4-11	5	5 ST4
24	6 A3J4-9	6	6 KEY
25	7 A3J4-8	7	7 N/U
26	8 A3J4-10	8	8 I/O
27	9 N/U	9	9 I I PLAY-FIELD
28	10 A3J4-7	10	10 I 2 FIELD
29	11 A5J4-13	11	11 N/C SW
30	12 A5J4-17	12	12 A3J3-11 RETURN
31	13 A5J4-16	13	13 N/C
32	14 A5J4-15	14	14 I 5
33	15 A5J4-14	15	15 A2J3-12
34	16 A5J4-7	16	16 A3J3-14
35	17 A5J4-6	17	17 A3J3-15
36	18 A5J4-5	18	18 A3J3-18
37	19 A5J4-4	19	19 A3J3-19
38	20 A1AI-15	20	
39	21 2AIJ1-15	21	
40	22 3AIJ1-15	22	
41	23 4AIJ1-15	23	
42	24 5AIJ1-15	24	
43	25 A1J1-19	25	
44	26 A1J1-18	26	
45	27 A1J1-17	27	
46	28 A1J1-16	28	

CABINET

AYFIELD

## NOTES

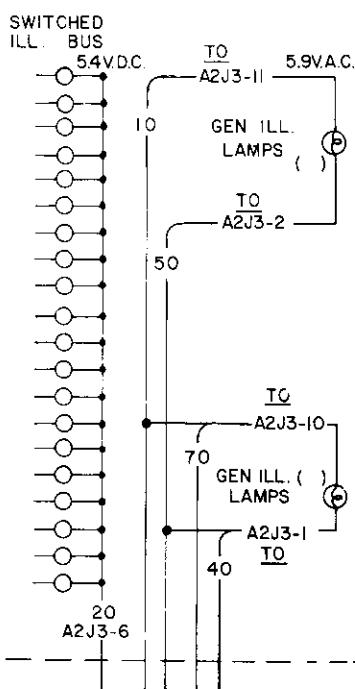
1. THESE PINS ARE RESERVED FOR FUTURE USE.
2. WIRE COLORS ARE SHOWN FOR ALL CONNECTOR PINS, SOME WIRES MAY NOT BE USED IN ALL GAMES.
3. \* INDICATES AID TEST POINT.

TABLE "B"		
FROM	TO	WIRE
A5J2-14	1	12
A5J2-2	2	20
A5J2-15	3	23
A5J2-16	4	34
A5J2-20	5	35
A5J2-6	6	85
A5J2-7	7	91

WIRE COLOR
1-RED
2-BLUE
3-YELLOW
4-GREEN
5-WHITE

## A2 TRANSFORMER

W-1187



	J1	TO
23	1	{A4J4-4 {A3J4-6
21	2	{A4J4-3 {A4J4-5
78	3	{A3J4-4 {A4J4-2
15	4	{A3J4-1 {A5J4-3
84	5	{A3J3-16 {A1J1-13
60	6	{A3J3-20 {A3J3-16
7	7	N/U
61	8	{A4J4-10 {A3J4-7
30	9	{A3J3-5 {A2J3-9
70	10	{A3J3-12 KEY
62	11	A4J1-7
13	12	N/U
	13	N/U
	14	N/U
	15	{A3J3-23 {A2J3-19

SOLID STATE SOUND  
SYSTEM MODULE A8

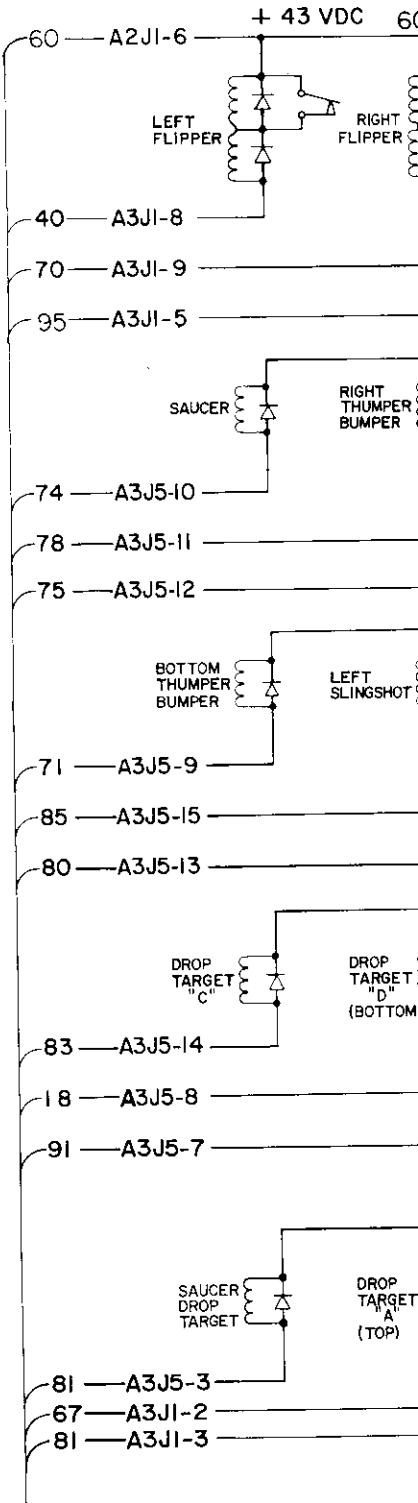
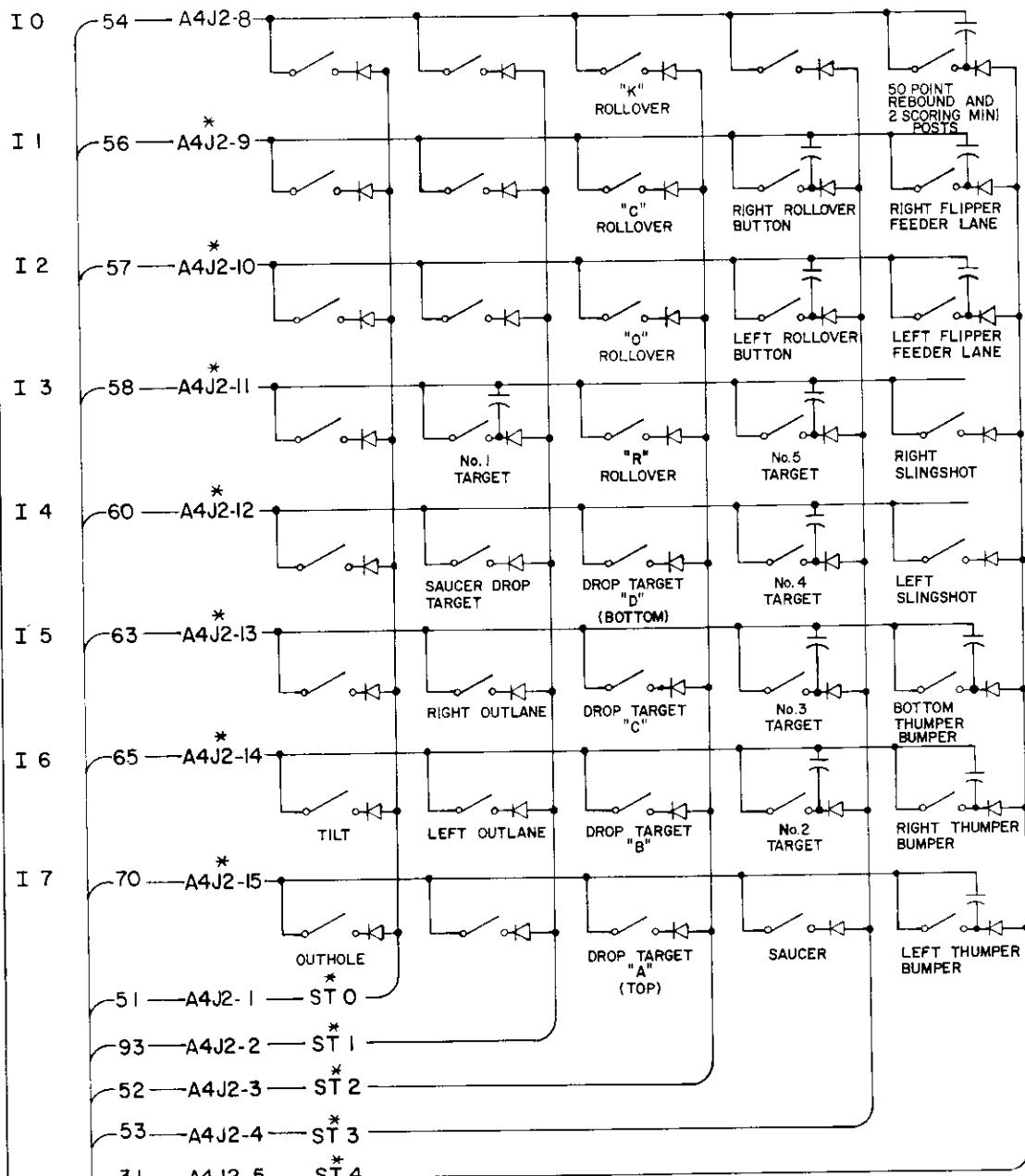
J2	1	2
	20	10

PLAYFIELD			CABINET		
J1	TO	FIELD	J2	TO	
50	1	GEN.ILL.RET.(BACKBOX)	38	1	GEN.ILL.BUSS
	2	GEN.ILL.RET.(BACKBOX)	40	2	SOL.BUSS
	3	SPARE	3	3	SPARE
	4	KEY	4	4	SPARE GRND.
	5	GEN.ILL.BUSS	5	5	GEN.ILL.RET.
	6	SOL.BUSS(PLAYFIELD)	6	6	SW.AC POWER
	7	SW.ILL.BUSS	20	7	AC RET.
	8	A3J3-12, A8J1-10	10	8	KEY
	9	A3J3-5, A8J1-9		9	FLIP.SW.RET.
	10	GEN.ILL.BUSS		10	PWR.LINE GND.
	11	GEN.ILL.BUSS			
	12	A4J4-15			
	13	SOL.BUSS			
	14	A5J4-11			
	15	A3J3-21			
	16	A3J3-22			
	17	A3J3-10			
	18	A3J3-3			
	19	A3J3-23			
	20	A3J3-24			

## A4

## VOLTAGE REGULATOR / SOLENOID DRIVER A3

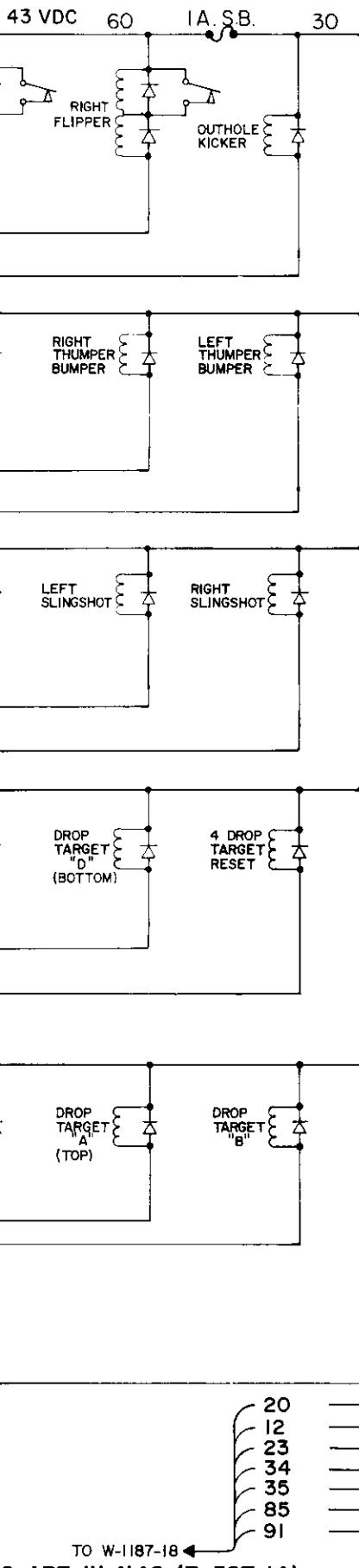
	J2	TO	J3	TO
51	1	STO	10	1 SELF TEST SW.
2	ST1	FIELD	13	2 STO SW. CAB.
52	3	ST2	14	3 ST1 STROBE
53	4	ST3	4	KEY
51	5	ST4	5	N/U
6	KEY	6	N/U	
7	N/U	7	N/U	
54	8	I0	8	N/U
56	9	I1	9	I0
57	10	I2	15	PLAY-
		FIELD	16	
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			312</td	



PLAYFIELD A6

NOTES

1. INDICATES NOT USED
2. N/U = NOT USED ON PLAYFIELD
3. \* INDICATES AID TEST POINT
4. COIL DIODES ARE IN4004, (E-587-6), SWITCH DIODES ARE IN4007, (E-587-6), TO ALL CAPACITORS ARE .05 MFD. (E-586-80)

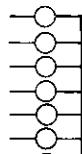


58 — A5JI-18 1K BONUS  
 60 — A5JI-19 5K BONUS  
 57 — A5JI-17 9K BONUS  
 56 — A5JI-23 "R" ROLLOVER  
 54 — A5JI-14 LEFT BUTTON 2K  
 13 — A5JI-15 LEFT BUTTON SPECIAL  
 12 — A5JI-16 RIGHT BUTTON 2K  
 78 — A5JI-28 RIGHT BUTTON SPECIAL  
 50 — A5JI-24 No. 1 TARGET  
 90 — A5JI-25 No. 2 TARGET  
 91 — A5JI-26 N/U  
 53 — A5JI-27 20K BONUS  
 41 — A5JI-1 2K BONUS  
 52 — A5JI-9 6K BONUS  
 51 — A5JI-8 10K BONUS  
 45 — A5JI-3 "0" ROLLOVER  
 43 — A5JI-2 LEFT BUTTON 4K  
 23 — A5JI-10 LEFT BUTTON 10K  
 34 — A5JI-7 RIGHT BUTTON 4K  
 25 — A5JI-6 RIGHT BUTTON 10K  
 48 — A5JI-5 2X ARROW  
 65 — A5JI-11 No. 3 TARGET  
 35 — A5JI-4 N/U  
 61 — A5JI-12 40K BONUS  
 96 — A5JI-13 RIGHT OUT SPECIAL

38 — A5J3-26 3K BONUS  
 36 — A5J3-25 7K BONUS  
 67 — A5J3-19 ROCK SPECIAL  
 27 — A5J3-17 "C" ROLLOVER  
 25 — A5J3-16 LEFT BUTTON 6K  
 98 — A5J3-23 N/U  
 40 — A5J3-27 RIGHT BUTTON 6K  
 12 — A5J3-21 3X ARROW  
 64 — A5J3-20 No. 4 TARGET  
 23 — A5J3-22 SAME PLAYER S.A.  
 72 — A5J3-24 60K BONUS  
 10 — A5J3-1 4K BONUS  
 21 — A5J3-12 8K BONUS  
 30 — A5J3-15 No. 5 TARGET FEATURE  
 20 — A5J3-11 "K" ROLLOVER  
 15 — A5J3-9 LEFT BUTTON 8K  
 13 — A5J3-13 CREDIT INDICATOR  
 14 — A5J3-4 RIGHT BUTTON 8K  
 95 — A5J3-2 LEFT OUT SPECIAL  
 91 — A5J3-10 5X ARROW  
 56 — A5J3-18 No. 5 TARGET  
 81 — A5J3-3 WHEN LIT I-5 SPECIAL  
 84 — A5J3-14 N/U  
 20 — A2J1-7 FEATURE LAMP BUS

20 — A5J2-2 EXTRA BALL ARROW  
 12 — A5J2-14 25K DROP TARGET  
 23 — A5J2-15 SPECIAL DROP TARGET  
 34 — A5J2-16 5K DROP TARGET  
 35 — A5J2-20 10K DROP TARGET  
 85 — A5J2-6 15K DROP TARGET  
 91 — A5J2-7 20K DROP TARGET

TO W-1187-18  
S ARE IN 4148, (E-587-14)



REMOVE ALL BURNS		DR BY	DATE
E. V.		CK BY	DATE
APD BY		DATE	
APD BY		DATE	
FINISH:			
PRINT CONTROL:			
NAME:		Bally MANUFACTURING CORP.	
		2640 BELMONT AVENUE	
		CHICAGO, ILLINOIS	
		11	
SWITCH MATRIX		ASSEM NO. USED	
MATERIAL		ROLLING STONES	
PART NO.		W-1192	

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LET.	CHANGE	DATE	BY	CA.

PLAYFIELD MYLAR PROTECTORS

FQ-589

ENCLOSED ARE TWO MYLAR PROTECTORS WHICH MAY BE ATTACHED TO THE PLAYFIELD IN FRONT OF THE SLINGSHOT KICKERS AS SHOWN IN SKETCH. THESE WILL HELP TO PRESERVE PAINT FINISH IN FRONT OF SLINGSHOTS.

TO APPLY, SIMPLY REMOVE PAPER BACKING AND PLACE MYLAR WITH FLAT EDGE TOUCHING THE TWO SLINGSHOT POSTS.

